HANDBOOK

BSc (Hons) Agricultural Sciences and Management

FACULTY OF AGRICULTURAL SCIENCES

2018/2019

Sabaragamuwa University of Sri Lanka
P.O.Box 02, Belihuloya, 70140, Sri Lanka
Web site : www.sab.ac.lk

FACULTY OF AGRICULTURAL SCIENCES
SABARAGAMUWA UNIVERSITY OF SRI LANKA

HANDBOOK

The Faculty of Agricultural Sciences, reserves the right at any time, with the approval of the Senate, to change or modify any aspect of any course or programme whenever, in its judgment, it becomes necessary or advisable to do so.

Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka,
P.O. Box 02, Belihuloya, 70140, Sri Lanka.
Tel : 045 2280041
E-mail : *dean@agri.sab.ac.lk*
Web : http://www.sab.ac.lk/agri

SABARAGAMUWA UNIVERSITY OF SRI LANKA

VISION

"To be an internationally acclaimed centre of excellence in higher learning producing dynamic leaders and nation builders to guide the destiny of Sri Lanka"

MISSION

"Our mission is to search for and disseminate knowledge promote learning, research and training to produce men and women proficient in their respective disciplines possessing practical skills and positive attitudes enabling them to contribute towards the man power requirements of the nation"

It will be a centre of excellence for research and development for the Sabaragamuwa Province in particular and Sri Lanka in general.

CONTENTS

1. INTRODUCTION

1.1 Sabaragamuwa University of Sri Lanka

1.1.1 Background

The Sabaragamuwa University of Sri Lanka was established under the Universities Act Number 16 of 1978 on 7th November 1995 and ceremonially inaugurated on 2nd February 1996. Assigned to the University are the Faculties of Agricultural Sciences, Applied Sciences, Geomatics, Management Studies and Social Sciences and Languages set up at Belihuloya in Rathnapura District of the Sabaragamuwa Province. The University has established a Faculty of Graduate Studies as well.

SUSL has eight study centers/units viz. Centre for Computer Studies, Staff Development Centre, Career Guidance Unit, Center for Open and Distance Learning, English Language Teaching Unit, Centre for Indigenous Community Studies, and Sabaragamuwa University Industry Community Interaction Cell (SUICIC) established within the University.

1.1.2 Vision and Mission of the University

The University has a vision "to be an internationally acclaimed centre of excellence in higher learning and research, producing dynamic managers, leaders and nation builders to guide the destiny of Sri Lanka".

The mission of the University is to search for and disseminate knowledge, promote learning, research and training to produce men and women proficient in their respective disciplines possessing practical skills and positive attitudes enabling them to contribute towards the man power requirements of the nation"

It will be a centre of excellence for research and development for the Sabaragamuwa Province in particular and Sri Lanka in general.

In support of its vision the University has setup five goals, in its corporate plan

- to enhance the employability of graduates
- to enhance the research capacity and its impact
- to expand the service delivery assuring increased opportunities and access
- to improve physical infra and super structures and human capital
- to improve effectiveness and efficiency of the university administration system

1.1.3 Faculties and Degree Programmes

The Sabaragamuwa University of Sri Lanka offers the following degree programmes through its five faculties.

The Faculty of Agricultural Sciences offers four year BSc Hons degree programme in Agricultural Sciences and Management through its three departments, the Department of Agribusiness Management, the Department of Export Agriculture and the Department of Livestock Production and a degree in BSc Hons in Food Business Management.

The Faculty of Geomatics offers BSc Hons degree programme in Surveying Sciences, through its two departments, the Department of Surveying and Geodesy and the Department of Cartography, Photogrammetry, Remote Sensing and Geographic Information Systems (GIS).

The Faculty of Management Studies offers BSc degree programmes in Business, Finance, Marketing, Tourism and Eco-Business Management through its four departments, the Department of Business Management, the Department of Accounting and Finance, the Department of Tourism Management and the Department of Marketing Management.

The Faculty of Social Sciences and Languages offers BA degree programmes in Social Sciences and Languages through its five departments; Economics and Statistics, Social Sciences, Languages, English Language Teaching and Geography and Environmental Management.

The Faculty of Applied Sciences offers four year BSc Hons degree programmes in Food Science and Technology, Environmental Sciences and Natural Resources Management, Chemical Technology, Computer Science and Technology, Applied Physics, Sports Science and Management, Physical Education, Computing and Information Systems through its five departments, the Department of Food Science and Technology, the Department of Natural Resources, the Department of Physical Sciences and Technology, the Department of Computing and Information Systems, and the Department of Sports Sciences and Physical Education. However, there is a possibility to exit at the end of the third year (completing a general degree) for students who enrol for BSc degree programmes in Environmental Sciences and Natural Resources Management and Physical Sciences.

The Faculty of Graduate Studies deals with the postgraduate programmes offered by the university. In addition, the university is in the process of developing its two new faculties, the Faculty of Technology and Faculty of Medicine.

1.1.4 University Logo, Flag and the University Anthem

University Logo

The University logo comprises of a traditional oil lamp, rays of light, book, the Samanala (peak wilderness) mountain, gems, and sheaves of paddy, symbolising the region and the people that it serves and the ideas for which they stands. The traditional oil lamp and the rays of light denote the imparting of knowledge and enlightenment; book represents education; the Samanala Mountain and gems stand for the Sabaragamuwa Province and Rathnapura District respectively, and the sheaves of paddy symbols prosperity.

University Flag

University flag comprises two colours maroon and gold, and the logo is in the centre of the flag. The maroon colour in the flag indicates maturity and the gold colour indicates the knowledge.

University Anthem

මේ ඔබේ සවියයි
මේ මගේ සවියයි
සබරගමුව සරසවියයි . . . //

සමනළ වැව පිපි නෙළුම් නෙලාගෙන
ගිරිකුළු වනරද මතින් ගලා යන
ජීවිතයේ කඳු මුදුන් සොයාගෙන
හාගල කන්ද නගින්නේ . . . //

සිරිපා පහනින් එළිය ලබාගෙන
මනරම් විදුණාණ අකුරු දරාගෙන
කළුගං පත්ලේ රුවන් සොයාගෙන
උඩුගම් බලා ඇදෙන්නේ . . . //

දෙරණේ උරුමය ලොවට බෙදාගෙන
සිප් කගගින් රුදු අඳුර නසාගෙන
ඔබෙත් මගෙත් හීනය කළුළිලි වන
දිනය උදා වන්නේ . . . //

මේ ඔබේ සවියයි
මේ මගේ සවියයි
සබරගමුව සරසවියයි . . . //

පද රචනය ඃ මහින්ද පතිරණ

1.2 Officers and Administrative Staff of the University

1.2.1 Chancellor

Most Venerable Prof. Kamburugamuwe Vajira *Thero*

1.2.2 Officers

Vice Chancellor (Acting)	Prof. W.K.A.C Gnanapala
Dean / Faculty of Graduate Studies	Dr. K.M.M.I. Ratnayake
Dean / Faculty of Agricultural Sciences	Prof. M.P. Sumith Magamage
Dean / Faculty of Applied Sciences	Prof. R.M.U.S.K. Rathnayaka
Dean / Faculty of Geomatics	Dr. H.M.I. Prasanna
Dean / Faculty of Management Studies	Prof. W.K.A.C Gnanapala
Dean / Faculty of Social Sciences and Languages	Dr. W. Manoj Ariyaratne
Dean / Faculty of Technology	Dr. A.D. Ampitiyawatta
Dean / Faculty of Medicine	Prof. Nirmalie Wickramarathne
Registrar (Acting)	Mr. Kamal Gunawardana
Librarian	Ms. T.N. Neighsoorei
Bursar	Mr. K.A.R.S. Jayakody

1.2.3 Administrative Staff

Deputy Registrar (Academic Establishments)	Mr. K. Gunawardana
Deputy Registrar (Examinations)	Mr. M.L. Warnasooriya
Deputy Registrar (General Administrations)	Mr. J.G.P.U. Ratnayake
Senior Asst. Registrar (Capital Works and Planning)	Ms. S.D.D. Hiranthi
Senior Asst. Registrar (Student Affairs)	Mr. G.A.D.M. Thennakoon
Senior Asst. Registrar (Non Academic Establishments)	Ms. W.N.P.M.N.M. Karunarathne
Senior Asst. Bursar (Payments)	Ms. K.D.D.S. Sugathapala
Senior Asst. Bursar (Accounts)	Ms. C.P. Hatharasinghe
Senior Asst. Bursar (Salaries)	Mr. R.M.N.K. Rathnayake
Asst. Registrar (Faculty of Agricultural Sciences)	Ms. M.D.N.K. Meddage
Asst. Registrar (Faculty of Applied Sciences)	Ms. A.A.Y. Abeysinghe
Asst. Registrar (Faculty of Geomatics)	Ms. H.H.K.N. Dharmasiri
Asst. Registrar (Faculty of Management Studies)	Ms. R.N. Neluwapathirana
Asst. Registrar (Faculty of Social Sciences and Languages)	Ms. A.A.S Priyadarshanee
Asst. Registrar (Faculty of Technology)	Mr. D.S.R.C. Savanawadu
Asst. Registrar (Faculty of Medicine)	Ms. I.U. Wijethungaarachchi
Asst. Registrar (Post Graduate Studies)	Mr. A. Krishnadhas
Asst. Registrar (CODL)	Ms. H.K.I.P. Abeysinghe
Asst. Registrar (Office of Vice Chancellor)	Ms. M.P.G. Silva
Asst. Registrar (Library Services)	Ms. H.P.K.N.D. Siriweera
Asst. Registrar (Examinations)	Mr. T.D.A.M. Wijerathne

Asst. Registrar (Legal)	Ms. P.B.N. Fernando
Asst. Bursar (Supplies)	Mr. V.K.S. Chathumal
Asst. Bursar (Payments)	Ms. G.K.N. Udeshi
Asst. Bursar (CODL)	Ms. N.P. Wijendra
Asst. Bursar (Income)	Ms. G.K.M. De Silva
Curator	Mr. R.D. Rajapaksha
Works Engineer (Civil)	Mr. W.M.L.M.K. Wijesundara
Farm Manager	Mr. C.N.K. Balasooriya
Medical Officer	Dr. W.M.A.S. Wijerathne

2. FACULTY OF AGRICULTURAL SCIENCES

2.1 Information at a Glance

Address	:	Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka, Belihuloya – 70140.
Telephone	:	045 2280041/ 2280046/ 2280073/ 2280074,
Fax	:	045 2280041
Website	:	http://www.sab.ac.lk
Location	:	2 km from Colombo Badulla Road
Distances to main towns	:	18 km to Balangoda, 30 km to Haputale 60 km to Ratnapura 50 km to Bandarawela
Nearest Post Office	:	Sub post office – Belihuloya
Nearest Railway Station	:	Haputale
Police Division	:	Samanalawewa/ Balangoda
Hospitals	:	University Medical Centre, Rural Hospital, Pambahinna
Divisional Secretariat	:	Imbulpe
District	:	Ratnapura
Grama Niladari Division	:	Muththettuwegama
Elevation	:	600 m above MSL
Average Annual Temperature	:	25^{o}C
Annual Rain fall	:	1250 mm
Accommodation for Visitors	:	University Guest Houses Farm Stay Belihuloya Rest House Pearl Inn, Belihuloya River Garden Hotel, Belihuloya Water Garden Hotel Belihuloya and many more places to stay.

2.2 Mission of the Faculty

The mission of the faculty is to search for, and disseminate knowledge in the sphere of Food and Agriculture. The faculty produces graduates in Food and Agricultural Sciences who are proficient in the sciences/disciplines and practical skills in food and agriculture to contribute towards the manpower requirements of the nation.

2.3 Objectives of the BSc (Agricultural Sciences and Management Degree Programme

The objectives of the degree programme is to produce graduates who would be able to

- Demonstrate broad knowledge in agriculture related subjects in Plantation, Horticulture, Livestock and Agribusiness Management.
- Apply theoretical knowledge in practical situations of commercial agriculture.
- Apply scientific knowledge to define, analyze and solve agricultural and agriculture related environmental problems
- Design and conduct scientific inquiries and experimentation when required
- Apply the principles of sound practice in relation to health, safety, animal welfare and the environment in agricultural and related industries
- Exchange, acquire and disseminate scientific and industry related information and be a partner in technology transfer
- Demonstrate excellent communication and interpersonal skills
- Secure employment opportunities worthy of the degree earned

In order to be able to achieve the above objectives, the Faculty undertook several activities to define its graduate profile.

The knowledge, skills and attitudes expected by potential employers from a graduate in agriculture have thus been identified as, knowledge and skills of subject disciplines; job commitment; good working knowledge of English; knowledge of IT; ability to meet deadlines and complete assigned tasks; punctuality; emotional maturity to take on responsibilities; ability to use resources effectively; ability to work with minimum supervision; honesty; general intelligence and ability and willingness to work diligently.

All of the above attributes and many more are basically categorized into seven broad criteria given below, as the abilities and skills that should be developed in a graduate.

- Graduate profile
- Intellectual skills
- Practical skills
- Numerical skills
- Communication skills
- ICT skills
- Interpersonal and teamwork skills
- Self management and professional development skills

Minimum performance levels of each of these have also been defined in order for a student to be eligible for graduation using benchmark statements and level descriptors in parallel to reputed universities in the world.

2.4 Location and Facilities

Location

The Faculty of Agricultural Sciences is located in one of the most picturesque areas of the Island in the southern foothills of the central mountain range by, 160 km away from Colombo, on the A4 highway. It is 18 km from Balangoda, 60 km from Ratnapura, 30 km from Haputale and 50 km from Bandarawela.

The faculty shares the facilities of the Sabaragamuwa University of Sri Lanka with the faculties of Social Sciences and Languages, Management Studeis, Applied Sciences, Geomatics, Technology, Medicine and Graduate studies.

Laboratories under Department of Export Agriculture

Agronomy Laboratory

Agronomy Laboratory is equipped with substantial amount of physical and human recourses to conduct undergraduate practical basically on plant science, plant protection, horticulture and agronomic aspects. Hands on experiences are provided for each student during the practicals in laboratory by grouping them in manageable numbers at practical sessions.

Chemistry laboratory

Chemistry Laboratory is located at the main faculty premises and equipped with many modern instruments and equipment basically to carryout practicals on soil science and agriculture chemistry. Laboratory determination of soil water status, analysis of soil chemical, physical, biological properties are among the basic soil science practical. Most of practical sessions in the discipline of agriculture chemistry and agronomic aspects are also being conducted with the same facility.

Machinery Laboratory

Machinery Laboratory is located in *Mungastenna* premises of the faculty of Agricultural Sciences. This laboratory is equipped with basic farm machineries to facilitate the undergraduate practical sessions relating to tractor training and maintenance, basic engine operations and maintenance, calibration and maintenance of agriculture equipment. With the establishment of the machinery laboratory, necessity of bringing students for tractor training into the outside institutions were minimized and almost all practicals relating to agriculture machinery and agriculture engineering are being conducted with the laboratory. The laboratory is in the stage of developing and it is to be developed as a machinery research lab with the facilities of welding plant, lathe machinery and specialized technical manpower in near future.

Plant Pathology Laboratory

Plant Pathology laboratory is recently established in the faculty premises and serves as one of key physical space for undergraduates in plant pathology research practicals.

Laboratory is equipped with novel equipment to carryout microscopic diagnosis of plant diseases and microbiological studies. Laboratory is still developing in line with international standards to uplift student's skills in clinical plant pathology.

Tissue Culture and Plant Biotechnology Laboratory

Plant tissue culture, biotechnology and plant science research are the key areas mainly deal with this laboratory. Apart from undergraduate practical sessions in the laboratory, routine tissue culture plant production also practicing with the aim of commercializing in the future. DNA extraction, purification and quantification activities are being practiced in various plant genetic engineering research programmes initiated in the laboratory.

Laboratories under Department of Livestock Production

Livestock Production Laboratory

Livestock production laboratory is situated in the faculty premises and is the place for most of the student practicals under the Biochemistry, Food Science, Microbiology and Animal Nutrition disciplines. It is equipped with sophisticated instruments and laboratory chemicals which will facilitate the student practicals as well as the undergraduate research under the Department of Livestock Production. It also possesses the preserved animal samples including animal skeletons to facilitate the students to study the anatomy and physiology of farm animals. In addition, the laboratory also facilitates the hatchery operation practicals under Poultry production. The laboratory maintains well-organized set up with Standard Operating Procedures (SOP) and Safety Concerns. Overall, the Livestock Production Laboratory utilizes the available resources efficiently to provide a good learning environment for the undergraduates.

Diary Technology Laboratory

This laboratory is situated in the *Mungasthanna* premises of Faculty of Agricultural Sciences. It is equipped with almost all the equipment necessary for the manufacturing of dairy products such as Yoghurt, Curd, Ice-Cream, Butter and Cheese. Students get a very good hands-on experience and confidence in the product manufacturing through this laboratory where they are involved in practicals as well as the commercial level production of dairy products. There are a lot of product based researches carried out in this laboratory, which facilitate the innovative and creative ideas of the students.

Meat Processing Laboratory

This laboratory is also found in *Mungasthanna* premises and is the house for all the meat science based practicals and research. The facilities available there could be used to produce and store Sausages, Surimi and Meat Balls under hygienic conditions. It is also equipped with vacuum packing machine to facilitate the hygienic packaging of the products. Students can get a good practical exposure to a small scale meat product processing line under this laboratory.

Histology Laboratory

The histology laboratory provides opportunity for undergraduate practicals and both graduate and undergraduate research experiments related to histological aspects. It is equipped with novel tissue sectioning system (Microtome) and tissue embedding system for processing of animal tissues used for histological analysis. There are also facilities for Hematoxylin and Eosine staining of animal tissues in this laboratory. This laboratory is situated in the *Mungasthanna* premises of the Faculty of Agricultural Sciences.

Reproductive Biology and Animal Biotechnology Laboratory

This laboratory has sophisticated equipment and chemicals to facilitate isolation, counting and in-vitro culture and growth of animal cells and is found in the *Mungasthanna* premises. It is operated under a standard setting and provides room for hands-on experience and innovative research ideas in reproductive biology of animals. It also facilitates the student practicals related to assisted reproductive techniques such as Artificial Insemination, in-vitro fertilization etc.

Aquaculture Laboratory (Aquarium)

The Aquaculture Laboratory is situated in the faculty premises and is a very pleasant and intimating place to visit. It facilitates the student practicals and research related to management and breeding of a wide variety of ornamental fish species. It also gives hands on experience for students on the live feed production in aquaculture. It is equipped with accessories necessary for catching, rearing, breeding and disease management of various fish species. It is currently under the development for the production of fish larvae for sale in future.

Libraries

Students can use both the Central Library and the Library of the Faculty of Agricultural Sciences. The Central Library of the University is rich with more than 65,000 printed publications and very precise collection of periodicals, which can be used by the students, and the staff of the university. The Faculty Library has collected around 21000 books for the lending and reference sections in relation to the subjects taught at the Faculty. In addition to the valuable collection, the reference section has subscribed to periodicals including General Agricultural serials, Animal husbandry and Livestock serials, Forestry and Environmental serials, Food science and Technological serials, General Science serials, Management and Economics serials, and daily and weekly Sinhala, English and Tamil newspapers.

The Reference section of the Faculty Library is opened from Monday to Friday from 8.00 am to 6.00 pm and Saturdays from 8.00 am to 5.00 pm. The lending section is opened from Monday to Friday from 8.00 am to 4.00 pm. The above-mentioned opening hours are subjected to change during the period of examination and other special events with the approval by University administration. Students of the faculty are allowed to borrow several books from both sections under the library rules and regulations. Permanent Reference (PR) books and periodicals are not for lending.

The Central Library as well as the Faculty Library provides you the automated catalogue connected to the World Wide Web, which will provide online searching and reservations. In addition to the above services, the library handles all the transactions through library-automated system. The Faculty library also has an e-learning section. Further, the Faculty Library provides

special photocopy service for the faculty students at a nominal rate. Penalty for lending books, which are returned late, will be one Rupee (Rs.1.00) per day per book and two Rupees (Rs. 2.00) per hour, per book for reference books. Other charges at the library will be made according to the rules and regulations of the library.

E-learning Centre

E-learning facilities for both students and lecturers are also available in the Faculty. These facilities can be used to search articles and for self studies where students can join with lecturers through e-learning facilities.

Agribusiness Research and Development Center (ABRDC)

The Agribusiness Research and Development Centre is established at the Faculty of Agricultural Sciences, to serve as a resource base for research, teaching assignments, development activities and consultancies in the sphere of Agribusiness Management.

Computer Unit

The IT Centre of the Faculty is fully equipped and currently operating in networked environment with 65 computers. Internet facilities are available in the computer centre and on weekdays it is kept opened from 8.00 am to 9.00 pm. and during weekends from 8.00 am to 4.00 pm. Students can use the printing facilities in the centre for their academic needs. The main objective of the courses offered by the IT unit is providing the basic knowledge about computer studies. Software packages are available for database management, spreadsheets, and word processing; graphic design and statistical software packages for data analysis are also available.

Language Laboratory

Fully equipped complete language laboratory has been established at the Faculty of Agricultural Sciences for the use of students and staff. Many activities according to the new curriculum of English are arranged for students in this language laboratory to improve their speaking and listening abilities.

Faculty Farm

About 38 acres of land is being developed as a teaching farm for the Faculty at Belihuloya. A wide range of vegetable crops is grown right through the year depending on the season. Integration of Livestock and Crops is aimed at, in the future development programme of the farm. One-acre of coconut, rubber and tea cultivation is already established. Agrotourism, Organic farming and Eco-farming are the new concepts introduced in the farm.

Processing Unit

A processing unit has been established for processing milk and meat where students can learn about the procedures of processing. The practical and research work related to processing, especially under the Department of Livestock Production, are conducted in this processing unit established next to the Faculty Farm.

Agri- Mart

Agri-Mart has been established to sell high quality crop and livestock products of the Faculty

Farm. Vegetables, chicken, mutton, pork, eggs, milk, bee honey, yams and yoghurt are available in Agri-Mart.

Agrifac Farm Stay

Cabanas established in the farm for Agro-tourism are opened for tourists since 02nd February 2010. Agrifac Farm Stay is a perfect stopover on the Colombo-Badulla Highway and a charming and peaceful holiday destination for much needed "getaway-from-it-all" restful break. An unforgettable, warm, and friendly farm style Bed & Breakfast experience awaits you in this pleasant atmosphere.

Printing Unit

A printing unit has been established which covers almost all the printing tasks related to academic, research and administrative activities in the university. This unit serves the whole university.

Student Services

Hostels **:** Accommodation with basic facilities is provided for all students.

Financial assistance **:** Bursary and Mahapola scholarship payments will be made monthly at the bank. Exact date of payment is subjected to change from month to month but will be announced in advance.

Canteens

Breakfast, lunch, dinner, tea, cool drinks and various snacks are available in the canteens throughout the day. Main meals should be ordered in advance. You can also purchase groceries, stationeries etc., from the canteens or from the welfare centre.

Sports Facilities

The university playground is available for sports activities. Outdoor courts are provided for Tennis, Basket ball, Volleyball and Netball. Indoor facilities are available for Table Tennis, Squash, Badminton and Weights training. A 25m long swimming pool is located at the sports complex. There are facilities available for many other sports.

Audio-Visual Unit

The audio visual unit has been established which covers almost all the audio visual tasks related to academic and research activities in the university. This unit serves the whole university.

Mail

Incoming mail is kept in student mailbox at the Faculty office. Address should include the name of the student, Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka, Belihuloya 70140.

Extra Curricular Activities

Art Society maintains a wall magazine "Mansala" on which students can publish their original poems, stories and art work in all three languages.

Further, Faculty Explorers Club is engaged in various types of activities; outings, tree planting campaigns, field visits and public educational and awareness programmes on the conservation of flora and fauna. This society provides an opportunity for bird watching and studying of flora and fauna in this particular area.

Bus Service

Buses between Kumbalgama and Balangoda pass the main university entrance. Buses on the Colombo-Badulla road pass the Pambahinna Junction frequently. CTB busses start for Colombo from the Campus every morning at 4.45 am., 10.00 am and 2.00 pm.

Time	Bus Routes
1.00 A.M.	SUSL to Kurunegala
4.45 A.M.	SUSL to Colombo
10.00 A.M.	
2.00 P.M.	
5.00 A.M.	SUSL to Ambilipitiya
1.50 P.M.	SUSL to Maharagama
3.00 P.M.	SUSL to Panadura
3.45 P.M.	SUSL to Warakapola

Banks

Bank of Ceylon has a branch office within the Campus. The People's Bank operates at Pambahinna.

Places of Worship

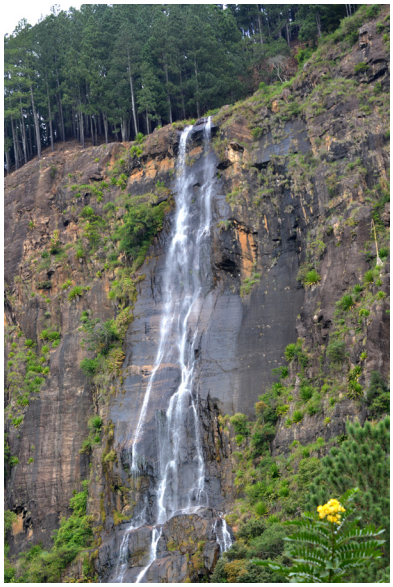
Buddhist University Buddhist Centre is located within the Campus. Karagastalawa Temple is about 1 km west of Pambahinna Junction; Niyandagala Aranya is about 1 km east of the junction; Seela Samadhi Meditation Centre is at Silogama, Belihuloya, Bodhi Rukkaramaya, Kinchigune is at 100 m south of the Faculty of Agricultural Sciences.

Catholic Ave Maria Catholic Church, Belihuloya; St. Anthony's Catholic Church, Kirindigala.

Hindu Kathirasan Kovil and Mariyamman Kovil are located Balangoda.

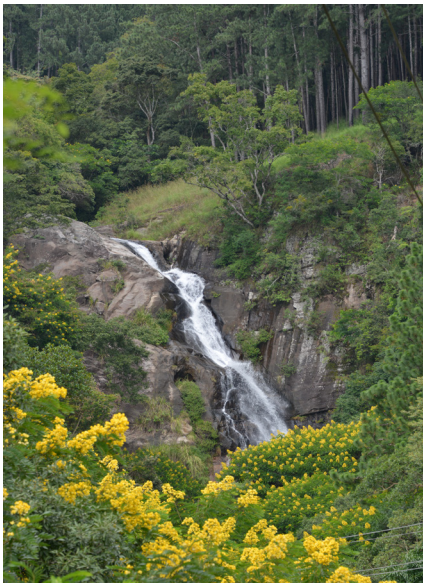
Islam Jumma Mosque, Balangoda and Jailani Mosque, Kooragala are the closest mosques. There is also a prayer room within the Students' Centre.

Places of Attraction



Bambarakanda Falls

Highest waterfall in Sri Lanka (241 m; 790 ft) located about 20km from the university off the Ohiya Road near Kalupahana plunges between Mt. Welihena and Bambaragala, over steep precipice bordered by dark, green pine forests. The deep pool in the valley below, is surrounded by paddy fields,



Suratali Falls

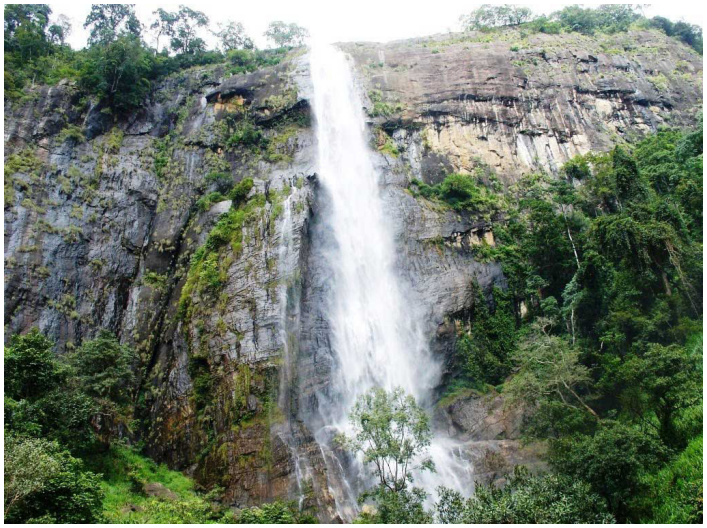
An eye-catching, 20m ribbon of water cascading down Ellamana at the eastern edge of the peak wilderness area. Name derives from Sinhala word for caressing. Located about 8km from the university near Halpe at 105 Mile-post on the Badulla A4 road.

Duvili Falls

This located just 25 Km away from the university. This magnificient waterfall crumples lamenting as loosened plait of hair of a beauty from summit to deep water receptacle at the cliff. Divili Falls canbe reached by turning at 16th mile post at Tanjantenna village at Balangoda-Kalthota route and proceeding 4 km through the jungle. The root-cause of Duvili falls, which would count 40 m high, is Walawe River.

Horton Plains

This 3,162 hectare national park is a natural playground without rivals in Sri Lanka. Best known for World's End, which on a rare clear day would offer a spectacular view of the sea. Also, home to Leopards, Sāmbhar, Eagles and many species of butterflies, as well as rare orchids, Keena trees and exotic mosses. Horton Plains is a watershed of tremendous importance containing the second and third highest mountains in Sri Lanka. World's End is a 21km journey up the motorable road through the Nonpariel Estate and a 4km walk through the jungle from there.



Diyaluma Falls

This is the second (220m) only to Bambarakanda in height. Diyaluma means "water gush" in Sinhala. Above the main fall of the Punagala Oya are several smaller falls that can be seen after climbing a steep path to the ridge from which the waters flow down. Diyaluma Falls is close to the Colombo Batticaloa A4 road between Koslanda and Wellawaya.

Galagama Falls

This is the last of a series of waterfalls on the Belihul Oya, a tributary of the Walawe Ganga. Local residents call the 5m fall "Pahantuda Ella" because it resembles the wick of an oil lamp, with the river pouring into a deep pool surrounded by a water smoothed rock wall. It is located about 5km away from the Belihuloya Rest House off the motorable road to Assaddunwela on a path through scrub jungle and paddy fields along the rocky riverbed.

Samanalawewa

This is located just 7km away, from the university. This 100m high dam has created a reservoir of nearly 350 square kilometers of water at the confluence of the Walawe Ganga and Belihul Oya rivers. The power station for the hydroelectric project, which has a capacity of 120 megawatts, is located about 6km away from the dam.

Sinharaja Tropical Rain Forest

Still relatively untouched by man, this rain forest is the only living witness to Sri Lanka's history. An estimated 75% of its flora is unique to this country and 19 of its 142 bird species have yet to be found outside this forest. Sinharaja is the wellspring for the Kukuleganga and Ginganga rivers. From the university, take the Colombo A4 road to Thirivana Ketiya Junction, about 5km before Ratnapura then follow the Kalawana Road to Weddagala town, and is about a 3 hour journey by a vehicle from the university.

Uda-Walawe National Park

This is home to more than 250 elephants, as well as barking deer, leopards, the red-faced malkoha and many other bird species. At the center of the park is the Uda Walawe tank, created by a 5km long dam on the Walawe Ganga. It's about 2½ hour trip by a vehicle from the university.

Faculty of Agricultural Sciences

Faculty of Agricultural Sciences

Faculty of Agricultural Sciences

Faculty of Agricultural Sciences

3. DEPARTMENTS AND PROGRAMMES OF STUDY

3.1 Departments

The faculty is composed of three departments of study

- Department of Agribusiness Management
- Department of Export Agriculture
- Department of Livestock Production

3.1.1 Department of Agribusiness Management

The Department of Agribusiness Management was established to be a centre of excellence in Food and Agribusiness sector in Sri Lanka which was the pioneer academic department in food and agribusiness management in the university system of Sri Lanka. We endeavor to provide a cohesive, dynamic, innovative and market-driven educational process for developing intellectuals and entrepreneurs for the present and future.

The present curriculum traverses through the disciplines of management, agribusiness, agricultural economics and agricultural extension. The updated curriculum is designed to enable graduates who specialize in agribusiness management to cultivate and enhance their potential for leadership, productivity and competitiveness. Our graduates can aspire for a career at middle and top managerial levels in the disciplines of general management, marketing, food and agribusiness, human resource management, economics etc.

3.1.2 Department of Export Agriculture

The mission of the department is to produce graduates who possess knowledge and skills in advanced agricultural technologies and are capable of managing horticultural and plantation operations of any scale.

Students who have chosen the Department of Export Agriculture are able to specialize in agri-environmental resource management, crop improvement and plant protection or crop production technology. Graduates specializing in these three modules in the Department of Export Agriculture are well equipped with knowledge and skills in modern techniques of commercial agriculture. Inclusion of an intensive farm practice course and an industrial training programme at reputed agro-industries to the curriculum is an advantage for enabling our graduates to play a pivotal role in the commercialization process of agriculture. Moreover, special emphasis is given on leadership and personality development and entrepreneurship development to enhance their skills and attitudes to face the challenges of the dynamic business world.

There are numerous employment prospects for these graduates, in the fields such as, private sector agro industries, public sector, research and development, international organizations, academic, and consultancy.

3.1.3 Department of Livestock Production

Department of Livestock Production strives to produce future leaders and innovators who can bear major responsibilities and perform roles for the enhancement of the livestock sector.

Students who have choosen Department of Livestock Production are able to specialized in Animal Bio-resource Technology Management or Aquatic Bio-resource Technology Management. The farm practice and the industrial training programmes in this department too have strengthened graduates for the job market in livestock and animal production so that it is not so competitive for graduates who have specialized livestock production to screen allied jobs.

Graduates specializing in these two modules in department are well equipped with knowledge and skills in modern techniques of livestock production and have job opportunities in different fields such as aquaculture, meat science, nutritious sector, dairy production, poultry production and higher education in Sri Lanka and also overseas.

3.2 Programme of Study

Name of the New Degree Program

The Faculty of Agricultural Sciences of Sabaragamuwa University of Sri Lanka awards a BSc (Hons) in Agricultural Sciences & Management degree. Students would still be registered through the same window of Agriculture. This Degree is placed at level 6 in the Sri Lanka Qualifications Framework by the University Grants Commision.

Salient Features of the Curriculum

The curriculum has adopted the course unit system where each course is worth a specific number of credits/units. It will have examinations during and at the end of the course. The students will earn grade points at these examinations depending on the credit number of specific courses. It is a semester based curriculum. A credit/unit is defined as 15 hours of theory or 30 hrs of laboratory practical/field practicals. The salient features of the new curriculum can be listed as follows.

- Industrial training component
- Practical orientedness
- 130 credits
- Additional hours for self learning
- Farm practice course
- Personality development Programme
- Assigning students to farm families- (on-farm training)
- Entrepreneurship Development Programme
- Exposure to international languages

Duration of the Degree Program

Four years of full time study is considered as a minimum requirement to acquire the necessary knowledge, skills and attitudes required for a graduate in agriculture. The four years will comprise of 8 semesters, 2 semesters per year with each semester having 15 weeks of academic work.

Credits/ Units

The total minimum requirement of credits to graduate in a 4-year study programme is 120 as specified by the Quality Assurance and Accreditation Council of Sri Lanka. The curriculum comprises of 130 credits.

Structure of the Study Program

The curriculum comprises of a core programme where the principles in knowledge, skills and attitudes necessary for a graduate in Agriculture are to be achieved, and a specialization programme which gives flexibility for a student to pursue a subject area of his/her choice for advanced training in that subject discipline. The core programme will be 71 credits and the specialization programme will be 59 credits thus totaling 130 credits that must be completed for graduation.

Core Programme (71 credits)

Crops and livestock production technologies along with the basic understandings of agribusiness management will be covered during the core programme which will be offered in the first two years (4 semesters) of the degree program. All the courses in the core programme are compulsory and have to be taken by all students.

The principles of agricultural sciences will be offered during the first year. The second year is considered as most suitable to offer the farm practice course. It will provide practical skills on crops and livestock production during the 3rd and 4th semesters respectively. Most of the theories of field crop production will be offered during the 3rd semester whilst emphasis will be given to courses on livestock production during the 4th semester. The students will spend a substantial portion of their time at the farm during the second year. It is expected that the students will achieve the required knowledge and the skills in crop and livestock production at the end of the core program.

Specialization Programme (59 credits)

From the 3rd year, students will select a specialization programme in the areas of Agribusiness Management, Agri Environmental Resource Management, Crop Improvement and Plant Protection, Crop Production Technology, Animal Bio Resource Technology and Management, and Aquatic Bio Resource Technology and Management. The last semester will be allocated for the industrial training component of the degree program. The courses in the specialization programmes are of two types- compulsory and elective. They have been designed so that students must take certain courses that are compulsory for a particular specialization program. Other courses could be selected from elective courses as advised by the department or module-in-charge.

Industrial Training and Research (Dissertation)

This has been identified as one of the strongest components of the existing curriculum. It will be offered in the 8th semester. Eight credits are allocated for the industrial training and research in the final semester – a component in the curriculum that is hoped would introduce the students to the working world. During this program, each student will address an identified problem in an industry related to their specialization program. They will make an oral presentation as well a written report at the completion of the training during this period.

This training has now been re-designed in order to achieve higher levels of learning outcomes required for an honours graduate in agricultural sciences.

Total of 8 credits will be allocated as follows for the Industrial Training programme and the research component.

- Industrial Training - 02 credits
- Research (Dissertation) - 06 credits

Additional Modules

English and Information Technology will be taught as basic courses. In addition, students will be offered with courses; Sri Lankan Studies and Current Affairs and World Studies and Current Affairs to enhance the general knowledge of students, A course on Personality Development would also be offered to enhance the graduate profile. In addition, students will be given a chance to learn an international language other than English such as Japanese, German, and Chinese as a non-credited and non-compulsory course.

Medium of Instruction

The medium of instruction at the faculty would be English. Hence the English curriculum has also been revised in order to cater to the needs of students. A total of 360 contact hours have been assigned for English in order to address the four skills – reading, writing, listening and speaking. English will be offered as a subject during all four years (1st – 6th semesters).

Course Notation

Each course in the curriculum would have a specific notation. The course notation would be such that it will have a prefix denoting the department which will offer the course followed by the year and semester in which it is offered and a two digit number which is the number given by that department for that course and the last digit denotes the number of credits allocated for that course. This notation will also show the credit number for that course and the number of theory and practical hours assigned to the course.

e.g.: EA 11012 (15/30)

Credit Unit

A credit unit is defined as 50 Notional hours for class room and laboratory oriented courses and 100 Notional hours for field practical base courses and industrial training courses according to SLQF guidelines.

Credited Courses

These are courses that will earn grade points for the students and contribute to the Grade Point Average (GPA) of a student. All courses in the core program, compulsory and elective courses in the specialization programs, industrial training programme and the research will be credited courses.

Non- credited Courses

These are courses that have to be taken by students as partial fulfillment for the requirements of the degree programme. They may have specific credit numbers, but will not contribute to the GPA of a student. These are courses in English, Personality Development, IT, alternative languages, Sri Lankan Studies, and World Studies and Current Affairs.

4. OFFICERS, ADMINISTRATIVE AND ACADEMIC STAFF OF THE FACULTY

4.1 Administrative Staff

Dean/ Faculty of Agricultural Sciences	- Prof. M.P. Sumith Magamage
Head/ Dept. of Agribusiness Management	- Prof. (Mrs.) D.A.M. De Silva
Head/ Dept. of Export Agriculture	- Dr. P K. Dissanayake
Head/ Dept. of Livestock Production	- Dr. T.S.P. Jayaweera
Assistant Registrar	- Ms. M.D.N.K. Meddage

4.2 Academic Staff

4.2.1 Department of Agribusiness Management

Head of Department

Prof. (Mrs.) D.A.M. De Silva

BSc Agric (Ruhuna) MBA (Pdn), PhD (Japan), Post Doc. (UK)

Research Interests : Agricultural Marketing, Value chain management, Fishery marketing & Trade, Climate Change, Gender.

Professors

Senior Prof. Rohana P. Mahaliyanaarachchi

MSc (PLOVDIV), PhD (Pdn), Post Doc. (Reading)

Research Interests : Agricultural Marketing, Agricultural Extension, Agricultural Management, Agricultural Tourism

Prof. M Esham

BSc Agric (Pdn), MBA (SriJ), PhD (Japan) Post Doc.(Japan) Post Doc (UK)

Research Interests : Entrepreneurship Development, Agribusiness Management, Climate Change

Senior Lecturers

Dr. (Mrs.) S.T.C. Amarasinghe

BSc Agric (Pdn), MPhil (Pdn), PhD (China), Dip (Business Management)

Research Interests : International Business, Agribusiness Management, Agricultural Economics

Dr. H.S.R. Rosairo

BSc Agric Hons (Pdn), MBA (Colombo), PhD (Lincoln, New Zealand), Post Doc. (Bradford, UK)

Research Interests: Agribusiness Management, Farmer Organizations, Agricultural Marketing

Dr. (Mrs.) S.H.P. Malkanthi

BSc Agric (Pdn), MPhil (Pdn), PhD (Thailand)

Research Interests : Agricultural Sociology, Agricultural Extension

Dr. A.W. Wijeratne

BSc Agric (Pdn), MSc (Pdn), PhD (China)

Research Interests : Mathematical modeling in business and economics, spatial statistics

Dr. R.K.C. Jeewanthi

BSc Hons (SUSL), MSc (South Korea), PhD (South Korea)

Research Interests : Functional Food, Product Development, Food Microbiology, Food Nutrition and Agribusiness Management

Lecturers

Mr. P. Sivashankar

BSc Agric (Pdn), MPhil (Pdn)
Research Interests : Agricultural Economics

Mr. I.C. Hettarachchi

BSc. Agric (SUSL)

Research Interests : Human Resource Management**,** Agricultural Tourism

Ms. M.S. Elapata

BSc. Agric (SUSL)

Research Interests : Agribusiness Management

Ms. K.K.H.M. Rathnayake

BSc. in Export Agriculture (UVA), Dip in MA (CIMA)
Research Interests : Agricultural Finance, Food Business Management

Ms. B.M.R.L. Basnayake

BSc. Agric (SUSL)
Research Interests : Food Supply chain Management, Agricultural marketing, Entrepreneurship and Innovations

4.2.2 Department of Export Agriculture

Head of Department

Dr. P.K. Dissanayake

BSc Agric (Pdn), MSc (Pdn), PhD (Japan)

Research Interests : Plant Biotechnology, Horticulture, Biodiversity, Post harvest physiology, Chlorophyll degradation of Horticultural crops, Underutilized fruit crops

Professors

Prof. A.A. Yasarathna Amarasinghe

BSc Agric (Pdn), MPhil (Pdn), PhD (China), Dip (Biotechnology)

Research Interests : Plant Biotechnology, Plant Cell and Tissue Engineering, Crop Genetics and Breeding

Prof. Lal P. Vidhana Arachchi

BSc Agric (Pdn), MSc (Malaysia), PhD (J'pura)

Research Interests : Soil and Water Management, Irrigation, Soil Physics, Improvement of degraded Lands

Prof. (Mrs.) P.M.A.S. Karunaratne

BSc Agric (Pdn), MPhil.(Pdn), PhD(UK)

Research Interests : Crop Modeling, Crop physiology, Environment stress physiology

Prof. P. I. Yapa

BSc. Agric (Pdn), MSc. (Pdn), PhD (UK)

Research Interests : Organic Agriculture, Waste Management, Soil Management, Environmental Sciences

Prof. (Mrs.) M.L.M.C. Dissanayake

BSc Agric (Pdn), MPhil (Pdn), PhD (Japan)

Research Interests : Moleculor Plant pathology, Moleculor characterization of pathogen, Toxins produced by fungi, Antimicrobial activiry of medicianal plants against plant pathogenic Microbes

Senior Lecturers

Dr. A.D. Ampitiyawatta

BSc. Agric (Ruhuna), MSc (Pdn), DEng (Wuhan-China), Diploma in Water Resource Engineering (China)

Research Interests : Water Resources Management, Ecohydrology, Rainwater Harvesting Agro-Climatology

Dr. G.D.K. Kumara

BSc. Agric (Pdn), MSc (Pdn), PhD (China)

Research Interests : Tissue culture Technology, Floriculture, Horticulture, Post harvest Physiology & Technology of Horticulture crops

Mrs. W.G.C. Wekumbura

BSc. Agric Sciences (SUSL), MSc. (Pdn), Mphil (Pdn)

Research Interests : Plantation Crop Production & Processing, Quality improvement of Plantation products, Silviculture & forestry

Lecturers

Dr. J.B.D.A.P. Kumara

BSc Agric Sciences (SUSL), M.Sc (Ind), PhD (Pdn)

Research Interests : Plantation Crops, Sustainable Agriculture, Plant Genetic Research

Mrs. W.M.A.U.K.M. Wijesekara

BSc. Agric Sciences (SUSL) M.Sc. (Pdn)

Research Interests : Botanical insecticides & antifeedants, Insect pest Management of Horticaltural crops.

Mr. G.A. Harshana Galahitigama

BSc. Agric (Ruh), MSc. (Ruh)

Research Interests : Field Crop Production, Plant Physiology, Sustainable Agriculture, Adaptation of Plants to Climate Change

Mrs. R. Nadeeka N. Perera

BSc. Agric Sciences (SUSL) MSc. (Pdn)

Research Interests : Population of dynamics of Agricultural pests and use of Bio pesticides in pest control

Ms. P.W. Malitha Tharindi

BSc. Agric (WUSL),

Research Interests : Plant breeding, Molecular genetics, Plant virology, Plant Biochemistry

4.2.3 Department of Livestock Production

Head of Department

Dr. T.S.P. Jayaweera

BVSc (Pdn.), MSc (Belgium), MPhil (Pdn), PhD (Pdn)

Research Interests : Meat Processing, Swine Production, Animal Health, Production of Low Cholesterol Meat

Professors

Prof. D.M.A. Gunarathne

BSc (Pdn), MSc (MUN,Canada), PhD (HKU,Hong Kong)

Research Interests : Starch Structure Functional Properties and Modification, Starch-based Food Product, Resistant Starch, Grain Science and Technology

Prof. M.P. Sumith Magamage

BVSc (Pdn), MAgric, PhD (Kobe- Japan), Post Doc. (Nebraska- USA), Post Doc. (India), Post Doc. (Sydney- Australia), Fulbright Academic and Research Fellow.

Research Interests : In vivo and in vitro growth maturation of mammalian oocytes, IVG-IVM systems for mammals, ART, Xenotransplatation, Molecular and cellular regulators of gonadal development and function. Diseases and clinical biochemistry, gene knockdown by si RNA, animal breeding.

Senior Lecturers

Dr. M.A.J.P. Munasinghe

MSc, PhD (USSR)

Research Interests : Genetic markers and their applications in livestock, Application of gene markers in poultry breeding, Quality management of food processing and handling

Dr. C.N. Walpita

BSc Agric (Pdn.) MSc (Belguim), PhD (Belgium)

Research Interests : Thyroid Endocrinology in early development, Target gene knock- down, Farming of lesser- known fish species, Environmental impacts of Aquaculture, Endemic fish species conservation.

Dr. (Mrs.) R.K. Mutucumarana

BVSc (Pdn), M.phil (Pdn), PhD (NewZeland)

Research Interests : Poultry Science & technology, Animal Health

Dr. (Mrs.) H.A.D. Ruwandeepika

BVSc (Pdn.), MSc (Belgium), PhD (Belgium)

Research Interests : In vivo and in vitro virulence genes expression of fish pathogens, Fish diseases, Clinical microbiology, Molecular Microbiology, Aquaculture

Dr. (Mrs.) R.M.A.S. Bandara

BSc Agric Sciences (SUSL), M.Phil (Pdn), PhD (Canada)

Research Interests : Animal behavior and welfare, Indigenous medicine for Animals

Dr. D. D. Wickramanayaka

BSc Agric Sciences (SUSL), PhD (Konkuk, South Korea)

Research Interests : Dairy Production and technology, Dairy Microbiology, Ruminant Nutrition

Lecturers

Mrs. H.M.G.P. Herath

Bsc. Agric sciences (SUSL), M.Phil (Pdn)

Research interests : Animal Nutrition Aquaculture

Mr. P.S. Kumara

Bsc. Agric sciences (SUSL), MSc (Gent- Belgium)

Research interests : Aquaculture fish breeding, Fish diseases

4.2.4 English Unit

Co-ordinator / Senior Instructor

Mr. J.S. Senadheera

BA (USJP), MA (Kelaniya), National Diploma in Teaching - English (NIE)

4.2.5 Library

Deputy Librarian

Dr. W.W.K.L. Wickramanayake

BA (Kelaniya), MLSc (Colombo), PhD (China)

4.2.6 IT Center

Co-ordinator/Instructor

Mr. W.H.D. Premawardhane

BSc (Colombo), PG Diploma (Colombo)

Instructor

Ms. S. H. Kiriella

BSc (Kelaniya), MSc (Pdn)

4.3 Faculty Board

Chairman Prof. M.P. Sumith Magamage

Members

Prof. (Mrs.) D.A.M. De Silva
Dr. P.K. Dissanayake
Dr. T.S.P. Jayaweera
Prof. Rohana P. Mahaliyanaarachchi
Prof. A.A.Yasarathna Amarasinghe
Prof. Lal P. Vidhana Arachchi
Prof. D.M.A. Gunaratne
Prof. M. Esham
Prof. (Mrs.) P.M.A.S. Karunarathne
Prof. P.I. Yapa
Prof. (Mrs.) M.L.M.C. Dissanayake
Dr. (Mrs.) S.T.C. Amarasinghe
Dr. H.S.R. Rosairo
Dr. (Mrs.) S.H.P. Malkanthi
Dr. M.A.J.P. Munasinghe
Dr. A.D. Ampitiyawatta
Dr. A.W. Wijerathne
Dr. C.N. Walpita
Dr. (Mrs.) R. K. Mutucumarana
Dr. G.D.K. Kumara
Dr. (Mrs.) H.A.D. Ruwandeepika
Dr. (Mrs.) R.M.A.S. Bandara
Dr. J.B.D.A.P. Kumara
Ms. W.G.C. Wekumbura
Ms. H.M.G.P. Herath
Mr. J.S. Senadeera
Ms. M.S Elapata
Mr. R.A.D.A. Ranasinghe (External Members)
Mr. B.L. Abeywardena (External Members)
Mr. K.P. Somachandra (External Members)
Dr. W.W.K. Lalith (on invitation)
Mr. W.H.D. Premawardana (on invitation)
Mr. C.N.K. Balasooriya (on invitation)
Ms. M.D.N.K. Meddage (Secretary)
Two Student Representatives

Department of Agribusiness Management

Department of Agribusiness Management

Department of Agribusiness Management

Department of Agribusiness Management

5. DEPARTMENT OF AGRIBUSINESS MANAGEMENT

Courses of Core Programme Offered by the Department of Agribusiness Management

<table>
<tr><th colspan="2">Year I</th><th colspan="2">Year II</th></tr>
<tr><th>Semester I</th><th>Semester II</th><th>Semester I</th><th>Semester II</th></tr>
<tr><td rowspan="2">Mathematics
AB 11012 (2:15/30)</td><td rowspan="2">Applied Statistics
AB 12012 (2:15/30)</td><td rowspan="4">Experimental and Survey Designs
AB 21012 (2:15/30)</td><td>Agricultural Extension
AB 22012 (2:30/00)</td></tr>
<tr><td>Macroeconomics
AB 22022 (2:30/00)</td></tr>
<tr><td rowspan="2">Principles of Management
AB 11022 (2:30/00)</td><td rowspan="2">Microeconomics
AB 12022 (2:30/00)</td><td>Human Resource Management
AB 22032 (2:30/00)</td></tr>
<tr><td>Fundamentals of Accounting
AB 22042 (2:30/00)</td></tr>
</table>

Course Capsules of the Courses Offered by the Department of Agribusiness Management

AB 11012 (2:15/30) Mathematics

Theory Preliminaries: Number systems, Equations and inequalities, Exponents, logs, roots and radicals; Coordinate Geometry and Preliminaries of Trigonometry: Cartesian plane, Equation of a straight line, Working with linear equations, Other geometric shapes, Preliminaries of trigonometry; Quadratic, Cubic and Higher Order Polynomials: Quadratic equations, Cubic and Higher order polynomials; Limits and continuity of functions: Limits, Techniques of limits, Continuity of functions; Differentiation: Preliminaries, Properties, Logarithmic, Trigonometric, Higher order, Curve sketching, Real world applications; Integration: Introduction, Rules of integration, Area, Volume; Matrix Algebra and Linear Systems: Matrix algebra, Linear systems

AB 11022 (2:30/00) Principles of Management

Theory Introduction to management, the management process, organizational structures, types of business organizations, Group dynamics, managing change, time management, quality management, Management by objectives, introduction to strategic management,

AB 12012 (2:15/30) Applied Statistics

Theory Introduction: Variability, Steps in scientific method, Population and sample; Descriptive Statistical Methods: Measure of centre, Measure of dispersion, Graphs and plots: Elementary Probability Theory: Probability, Theory of probability distributions; Statistical inference and hypothesis testing: Testing point estimations, Testing interval estimations, Analysis of count data, Software applications; Regression analysis: Simple linear regression and correlation, Multiple regression, Model building, Software applications

AB 12022 (2:30/0) Microeconomics

Theory Introduction to microeconomics, Theory of consumer behavior, Theory of demand, Elasticity of demand, Theory of supply, Theory of production, Theory of costs, Theory of market

AB 21012 (2:15/30) Experimental and Survey Designs

Theory Introduction to agricultural experimentation, Analysis of Variance (ANOVA); Experimental Designs: Single factor analysis of variance, Mean comparisons, Multiple factor analysis of variance, Non-orthogonal designs, Analysis of covariance, Nested designs, Mixed models, Software applications; Computer aided nonparametric statistical methods: Preliminaries, Nonparametric methods; Survey Designs: Introduction, Sampling techniques, Questionnaire construction

AB 22012 (2:30/0) Agricultural Extension

Theory Fundamentals of agricultural extension, Communication in agricultural extension, Audio visual teaching materials for extension programs, Importance of agricultural innovations for agricultural development, Facilities and resources for conducting effective extension service, Developing an extension program.

AB 22022 (2:30/0) Macroeconomics

Theory Key concepts in macroeconomics, National income accounting, Aggregate demand, IS-LM equilibrium, Unemployment, Inflation, International trade.

AB 22032 (2:30/0) Human Resource Management

Theory Introduction to human resource management, Recruitment and selection, Human resource development and training, Compensation and pay,

AB 22042 (2:30/0) Fundamentals of Accounting

Theory Introduction to financial accounting, Describe the rules of accounting, The accounting equation, Accounting Adjustments, Basic Financial Statements of Sole Proprietors, Company Accounts, Manufacturing Accounts, Cash Flow Statement, Interpretation and Financial Reporting

Courses of Specialization Programme Offered by the Department of Agribusiness Management

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year III Semester I	AB 31013	Agribusiness Management	(3:30/30)	Compulsory
	AB 31023	Business Law	(3:45/0)	
	AB 31033	Business Communication	(3:45/0)	
	AB 31042	Entrepreneurship	(2:30/0)	
	AB 31053	Marketing Management	(3:30/30)	
	AB 31061	Agri Business Venture Creation I	(1:8/15)	
	AB 31072	Agricultural Finance	(2:30/0)	
Year III Semester II	AB 32012	Agricultural Marketing	(2:30/30)	Compulsory
	AB 32023	Managerial Economics	(3:45/0)	
	AB 32034	Business Research Methods	(4:45/60)	
	AB 32042	Organizational Behavior and Dynamics	(2:30/0)	
	AB 32052	Agri Business Venture Creation II	(2:0/90)	
	AB 32063	Rural Business	(3:45/0)	Elective
	AB 32072	Innovation Management	(2:30/0)	
	AB 32082	Value Chain Management	(2:30/0)	
	AB 32092	Food Safety and Quality Management	(2:30/0)	
	AB 32102	Marketing Communication	(2:30/0)	

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year IV Semester I	AB 41012	Strategic Human Resource Management	(2:30/0)	Compulsory
	AB 41023	International Business & Trade	(3:45/0)	
	AB 41032	Agri Business Venture Creation III	(2:0/90)	
	AB 41041	Research Project I	(1:15/100*)	
	AB 41053	Practical Communication Skills	(3:30/60)	Elective
	AB 41063	Agri Tourism	(3:30/60)	
	AB 41073	Quality Management and Product Certification	(3:30/30)	
	AB 41083	Strategic Management	(3:30/30)	
	AB 41093	Energy Management	(3:30/30)	
	AB 41103	Quantitative Techniques in Agribusiness	(3:30/30)	
Year IV Semester II	AB 42012	Industrial Training	(2:0/200*)	Compulsory
	AB 42025	Research Project II	(5:0/500*)	

Non credit Courses offered by the Department of Agribusiness Management			Compulsory/ Elective
AG 11020	Sri Lankan Studies and Current Affairs	(0:15/0)	Compulsory
AG 11030	Personality Development	(0:30/0)	
AG 12020	World Studies and Current Affairs	(0:15/0)	
AG 31080	General Knowledge and Awareness in Agribusiness World	(0:15/0)	

* *Notional Hours*

Course Capsules of the Specialization Subjects of Department of Agribusiness Management

AB 31013 (3:30/30) Agribusiness Management

Theory The perspective of agribusiness: Introduction, Professional farm management, Computers in agribusiness, Alternative farm business structures in Sri Lanka and elsewhere; Management of farm production system: Farm machinery management, Farm buildings management, Farm land management; Farm staff management, Farm enterprise efficiency.

AB 31023 (3:45/0) Business Law

Theory Principle features of the legal system in Sri Lanka: The legal system in Sri Lanka - its development and sources, Introduction to Sri Lankan court system; Law of contracts, partnerships and company law: Introduction to law of contracts, Introduction to partnerships, Introduction to company law; Various legal documents related to organizational issues: Company act no.7 of 2007, Memorandum of association, Articles of association, Required forms for company incorporation, Required forms for commencement of business; Consumer protection laws

AB 31033 (3:45/0) Business Communication

Theory Importance of business communication: communication in modern business environments; Basics of communication: communication fundamentals, written and oral communication methods; Types of communication: interpersonal communication and practice, writing business letters and reports, conducting and facing interviews, conducting and participating in meetings, business presentation; How to prepare a curriculum vitae: resume and curriculum vitae writing

AB 31042 (2:30/0) Entrepreneurship

Theory Nature of entrepreneurship: Introduction, Schools of thought, Entrepreneurial personality and skills, Role of entrepreneurship in the economy; Entrepreneurship and creativity, Entrepreneurship and innovation; Entrepreneurial process: Idea generation, Opportunity analysis, Fundamentals of a business plan, Preparation of a business plan; New venture finance

AB 31053 (3:30/30) Marketing Management

Theory Marketing and marketing management process: Introduction to marketing management, Marketing functions marketing's role - facilitating exchange in society, Analyzing the marketing environment, Consumer markets and buying behavior; Marketing mix: 7 P's of marketing, Markets and buying behavior, Market segmentation and strategies; Product strategies, pricing strategies, and branding: Product strategies, Pricing strategies, Branding; Ethics in marketing, corporate social responsibility, tapping into global markets: New product offering, Ethics in marketing

AB 31061 (1:8/15) Agri Business Venture Creation I

Theory Entrepreneurial culture and creativity: Creativity and opportunity, Analyzing feasibility; Organize the venture and write a Business plan; Evolving the business

AB 31072 (2:30/0) Agricultural Finance

Theory Nature and scope of agricultural finance, Concept of credit and classification of credit, Farm financial management tools, Financial ratio analysis, Investment project appraisal techniques, Budgeting techniques; Sri Lankan financial markets, Types of financial institutions that are lending funds to the agricultural sector, Government policies affecting agricultural lending, Issues related to agricultural finance in Sri Lanka, Strategies for effective credit delivery in Sri Lanka

AB 32012 (2:30/30) Agricultural Marketing

Theory Introduction to agricultural marketing: Introduction to agricultural marketing, Link the marketing concepts to the agriculture, Marketing systems approach; Agricultural marketing and development: Agricultural input marketing, Consumables and durables, Market share analysis of important inputs, Agricultural marketing channels, Functions and role; Supply and value chains: Supply chains Vs value chains, Concepts and theories, Market actors and their role; Future trends in local, regional and international agricultural marketing: Strengths and weaknesses of small farmers in global supply chains for food and agricultural products, Value addition through product and process innovation

AB 32023 (3:45/0) Managerial Economics

Theory Nature, scope and methods of managerial economics, The Theory of the Firm, Demand theory, Demand estimation, Production theory, Cost theory; Strategy analysis: Market structure and pricing, Game theory, Pricing strategy, Investment analysis, Government and managerial policy

AB 32034 (4:45/60) Business Research Methods

Theory Introduction to Business and Management Research, Research process, Research approaches and research strategies; Develop a research proposal in business and management research: Develop research ideas, Problem statement, Research objectives, Research method; Plan a business and management research: Literature review, Data collection methods, Sampling techniques, Questionnaire design and testing; Practical experience in planning and conduct a research project, Disseminate the knowledge

AB 32042 (2:30/0) Organizational Behavior and Dynamics

Theory Organizational culture, Diversity and globalization, Organizational design, Cognitive processes of organizational behavior, Organizational dynamics

AB 32052 (2:0/90) Agri Business Venture Creation II

Theory Ability to start-up a business and to evaluate the growth potential of a small firm, Start-up a business, Develop practical skills, execution of the business plan

AB 32063 (3:45/0) Rural Business

Theory Rural business fundamentals, Rural business development, Rural business in agricultural development, Rural business organizations, Management of rural cooperatives, Rural business management

AB 32072 (2:30/0) Innovation Management

Theory What is the Management of Technological Innovation? Organizing for Innovation, Technological Innovation, Innovation Strategy, Networks and Communities of Innovators, The Management of Research and Development, Managing Product Innovation, The other side of R&D: Learning from Others, Capturing Value from Innovation, Conclusions and Future Challenges

AB 32082 (2:30/0) Value Chain Management

Theory Value chain : the approach, Value chain analysis for policy making, Limits of value chain approach; Domains of value chain analysis: Value chain model, Value chain management as strategic business analysis tool, Value chain components; Functional analysis of the value chain, Socio-economic context of the value chain, Analysis of the institutional set up, Analysis of input and output markets; Economic analysis of the value chain: Economic analysis at market prices, Building the production account of an economic activity

AB 32092 (2:30/0) Food Safety and Quality Management

Theory Economic importance of food safety, food safety in farming practices, Bio security and Bio terrorism, Principles of food safety, Pre Requisites Programmes (PRPs), Hazard Analysis & Critical Control Points (HACCP), Productivity tools and techniques for food processing enterprises, Food safety management systems,
ISO 22000: 2005 and implementation of the Food Safety Management System, Strategies for achieving food safety by SMEs

AB 32102 (2:30/0) Marketing Communication

Theory Introduction to marketing communication, Communication theory and communication process, Understanding how consumers process information, Marketing communications: strategies and planning, objectives and positioning, Branding and the role of marketing communications, Corporate identity, reputation and branding, Financial resources for marketing communications, Evaluating marketing communications, Marketing Communications Mix, its disciplines and applications, Promotional plan for an actual company

AB 41012 (2:30/0) Strategic Human Resource Management

Theory Strategic human resource management, Employee relations, Occupational health and safety, Managing global workforce

AB 41023 (3:45/0) International Business & Trade

Theory Introduction: Globalization, Drivers of Globalization, Changing demographics of Global Economy; Country Differences: Differences in Nations' Political Economy: Differences in Culture, Ethics in International Business; Global Trade and Investment Environment: International trade Theory, Foreign Direct Investment, Regional Economic Integration; Global Monetary Systems: Foreign Exchange Market, International Monetary Systems; Strategy and structure of International Business: The strategy of international business, The organization of international business, Entry strategy and strategic alliances

AB 41032 (2:0/90) Agri Business Venture Creation III

Theory continue the operation of the business as business plan developed in semester 5, operate the business plan and get positive results

AB 41041 (1:15/100*) Research Project I

Theory To achieve this unit a learner must:

- be able to demonstrate the ability to formulate a research proposal and communicate to an audience.
- display the ability to define a problem, to review relevant literature, and to synthesize research methodology and methods of collecting data.
- be able to demonstrate proposal writing and presentation skills.

AB 41053 (3:30/60) Practical Communication Skills

Theory Theoretical knowledge in effective speaking, telephone etiquettes and techniques, various interviewing types, doing effective presentations, and conducting effective meetings, Practice and gain skills in effective speaking, telephone etiquettes and techniques, various interviewing types, doing effective presentations and conducting effective meetings, Theoretical knowledge in proper ways in reading & writing and awareness on table etiquettes, Practice and gain skills in reading and writing in their day to day life and on table etiquettes

AB 41063 (3:30/60) Agri Tourism

Theory Definition of tourism, Global tourism development, What is agri-tourism?, Types of agri-tourism, Agri-tourism activities, Examples of agri-tourism, Agri tourist, Development of agri tourism products, Types of agri tourism products, Other activities of developing agri tourism products, Planning of Agri Tourism Farm, Writing a start-up business plan, Agri tourism marketing mix, Market positioning, Promotion

* *Notional Hours*

AB 41073 (3:30/30) Quality Management and Product Certification

Theory quality management concepts, Evolution of quality management and its significance, Quality management principles for excellence, Product and system certification, Quality policy and quality organizations

AB 41083 (3:30/30) Strategic Management

Theory Introduction to strategic management, Assessing internal and external environment, Strategic management process, Strategy in action, Business process re-engineering

AB 41093 (3:30/30) Energy Management

Theory Fundamentals of energy management, Dynamics of market forces and price mechanism in energy markets, Environmental implications of energy, Investment in renewable energy resources, Issues in energy efficiency and conservation

AB 41103 (3:30/30) Quantitative Techniques in Agribusiness

Theory Overview, Mathematical methods, Optimization: Unconstrained optimization, Constrained optimization; Linear Programming: Introduction, Mathematical background, Linear programming, Simplex method, Transportation problems; Regression, Time series analysis

AB 42012 (2:0/200*) Industrial Training

Theory To achieve this unit a learner must be able to:

- display attributes, skills, behavior, and attitudes required at a work place.
- apply appropriate scientific principles and techniques in a dynamic working environment.
- demonstrate the ability to establish effective relationships with others, and to define, share and delegate responsibilities.
- display skills of professional scholarships required for personal development and career management.

AB 42025 (5:0/500*) Research Project II

Theory To achieve this unit a learner must:

- exhibit scientific writing ability.
- analyze the data using appropriate techniques.
- discuss and interpret the results and draw conclusions from the study carried out.
- draw policy implications based on the results of the study

* *Notional Hours*

Non credit Courses offered by the Department of Agribusiness Management

AG 11020 (0:15/0) Sri Lankan Studies and Current Affairs

Theory Timely important 8-10 general aspects relevant to current affairs in the Sri Lankan context are discussed in this subject, This is a non credit course

AG 11030 (0:30/0) Personality Development

Theory Leadership, Interpersonal Relations, Communication, Stress Management, Group Dynamics and Team Building, Conflict Management, Time Management, Motivation

AG 12020 (0:15/0) World Studies and Current Affairs

Theory Timely important 8-10 general aspects relevant to current affairs in the global context are discussed in this subject, This is a non credit course

AG 31080 (0:15/0) General Knowledge and Awareness in Agribusiness World

Theory Fundamentals of agribusiness, Application of ICT in Agribusiness, Agribusiness in the world, Agribusiness Development, Agribusiness and farm machinery, Agribusiness and future trends, Agribusiness and Good Agricultural Practices (GAP)

Department of Export Agriculture

Department of Export Agriculture

Department of Export Agriculture

Department of Export Agriculture

6. DEPARTMENT OF EXPORT AGRICULTURE

Courses of Core Programme Offered by the Department of Export Agriculture

<table>
<tr><th colspan="2">Year I</th><th colspan="2">Year II</th></tr>
<tr><th>Semester I</th><th>Semester II</th><th>Semester I</th><th>Semester II</th></tr>
<tr><td>Microbiology
EA 11012 (2:15/30)</td><td>Irrigation and Water Resource Engineering
EA 12012 (2:15/30)</td><td>Farm Power and Mechanization
EA 21013 (3:30/30)</td><td rowspan="3">Plantation Crop Production
EA 22012 (2:15/30)</td></tr>
<tr><td>Agro-meteorology and Applied Hydrology
EA 11022 (2:15/30)</td><td>Introduction to Soil Science and Plant Nutrition
EA 12023(3:30/30)</td><td>Field Practices in Crop Production
EA 21024 (4:00/120)</td></tr>
<tr><td rowspan="2">Principles of Horticulture
EA 11032 (2:15/30)</td><td>Principles of Plant Pathology
EA 12032 (2:15/30)</td><td>Crop Physiology
EA 21033 (3:30/30)</td></tr>
<tr><td>Insect Morphology and Systematics
EA 12042 (2:15/30)</td><td>Rice Production Technology
EA 21041 (1:15/00)</td></tr>
</table>

Course Capsules of Core Courses Offered by the Department of Export Agriculture

EA 11012 (2:15/30) Microbiology

Theory Frequently used microbiology terminology and importance of microorganisms: Introduction to microbiology; The cultivation methods, isolation and identify various microorganisms: Methods of studying microorganisms; Biology of microorganisms; Physiology and biochemistry of microorganisms; Beneficial microorganisms in Agriculture: Utilization of beneficial microorganisms in agriculture.

Practical Laboratory equipment and laboratory safety; Preparation of microbial cultures: preparation of bacterial cultures (streakingand pour plates techniques), preparation of fungal pure culture (single spore techniques), study of morphological characteristics of fungi; Culture characteristics of bacteria; Preservation of microorganisms;self-study on utilization of microorganism in agriculture.

EA 11022 (2:15/30) Agro-meteorology and Applied Hydrology

Theory Measurement of various meteorological parameters: Interpret various meteorological data: Analysis rainfall data; Hydrological cycle and its components: Hydrological cycle, Infiltration, Runoff; Agro-ecological regions of Sri Lanka and explain the criteria for classification: Agro-ecological zones.

Practical Hydrological and meteorological parameters; Precipitation, types of precipitation, occurrence and causes; Wind and wind patterns; Identify and use various meteorological instruments; Identify different types of clouds; Analysis rainfall data; Infiltration; Runoff; Identify Agro-ecological zones of Sri Lanka.

EA 11032 (2:15/30) Principles of Horticulture

Theory Potential and drawbacks in the horticulture industry in world and in Sri Lanka:Introduction to horticultural crops, Present status and constraints in growing horticultural crops in world and in Sri Lanka; Cultivate and manage selected horticultural crops:Vernalization and its influence, Photoperiodic interactions; Environmental factors and management practices affecting the quantitative and qualitative yield: Environmental relations of horticultural crops, Pruning and growth control, Training of horticultural plants; Principles of plant propagation: Propagation techniques of horticultural crops, Potting mixtures, nursery mixtures and sterilization, Introduction to tissue culture; Fruit setting, development and changes in fruit ripening: Fruit development and fruit set, Physiological and chemical changes associated with ripening.

Practical Identification of horticultural items in Sri Lanka; Effect of photoperiodism on seed germination and flowering of horticultural plants; Identification of pruning methods and training methods of agricultural crops and tools needed for the practices; Asexual propagation techniques; Potting mixtures and nursery mixtures; Floral biology, types of fruits; fruit growth curve and fruit ripening.

EA 12012 (2:15/30) Irrigation and Water Resource Engineering

Theory Basic principles of water resources engineering: introduction to water resources engineering, hydraulics and fluid mechanics, water movements in conduits, Bernullie theory, venture meter, orifice meter, open channel flow, measurements of water flows (volumetric method, velocity area method measuring structures, tracer method) Soil water relationship and crop water requirement: availability and movements of soil water, soil water relationships, soil moisture constants, evapotranspiration, crop water requirement, irrigation scheduling and irrigation efficiencies; Selection of a suitable irrigation system: types of irrigation systems for different crops and cropping systems (surface, subsurface, drip, and sprinkler), problems related with irrigation systems, crop climate and economic factors to be considered in selecting a suitable irrigation system; Drainage: drainage, factors affecting for water logging, drainage methods, determination of drain spacing and drain design.

Practical Measurements of water flows (volumetric method, floating method, current meter method, measuring structures); determination of soil moisture content by various methods (gravimetric method, moisture meter, speedy moisture meter, tensiometer, gypsum block etc.); determination of field capacity, permanent wilting point; estimation of evapotranspiration; estimation of cop water requirement; irrigation scheduling, irrigation efficiencies; various irrigation methods; determination of drain spacing.

EA 12023 (3:30/30) Introduction to Soil Science and Plant Nutrition

Theory Standard soil profile and its function in sustainable crop production: Introduction to Soil Science, Soil formation; Physical, chemical and biological properties of soils that influence crop production: Soil colour, texture, Structure and aggregation, Bulk and particle densities, Pore space, Consistence; Inter-relationships of soil physical, chemical and biological properties to promote aeration, nutrient and water status of soil: Capillary and energy concepts, Water content and potential, Soil water movement and nutrient movement, Soil water retention, Moisture characteristic curve, Aeration and characterizing soil aeration, Pore size distribution, Factors affecting aeration, Effects and problems of aeration; Major soil constraints on crop production through appropriate soil testing: Soil colloids and organic matter, Cation and anion exchange, Nutrient balance (input and losses), Soil reaction, nutrient retention in the root soil interface, Redox potential and electrical conductivity, Soil pH, Soil salinity; Soil biological properties: Micro and macro fauna, Organic matter decomposition and nutrient retention, Vermicompost, Standard management strategies.

Practical Observation of different soil profiles; Identification of major constraints of different soil profiles; Laboratory determination of the soil physical properties;Laboratory determination of soil water status; Analysis of soil chemical properties;understanding of the macro and micro fauna for organic matter decomposition through audio video visuals.

EA 12032 (2:15/30) Principles of Plant Pathology

Theory The concepts and significance of diseases: Introduction to plant pathology; Understand interactions between plant, pathogen and environment: Causes of plant diseases; The concept of plant disease: Parasitism and Pathogenicity; The mechanisms by which the disease causing agents produce: How pathogens attack plants; The plants defend mechanisms against pathogens: How plants defend themselves against pathogens; General symptoms of Plant disease caused by plant pathogens; Principles and methods of plant disease: Control methods that avoidance of the pathogen.

Practical Plant pathology laboratory and equipment; Preparation of culture media, potato dextrose agar; Koch's postulates for fungi and bacteria; Sub culturing and preparation of pure culture; Plant disease diagnostic techniques.

EA 12042 (2:15/30) Insect Morphology and Systematics

Theory Diversity and importance of insects: Numbers and diversity of insects, Reason for insects' success, Economic importance of insects, Classification of Phylum Arthropod up to different classes; External morphological modifications in different insects, Introduction to Insects morphology, Structure and functions of body wall, Insect head and its appendages, Insect thorax and its appendages, Insect abdomen and external genitalia; Internal morphology of insects; Evolutionary perspective on the basic taxonomy and identify major insect orders and families: Principles of systematics, nomenclature and taxonomy, Metamorphosis of insects, Major taxonomic groups of class Insecta; Dichotomous keys to identify insects and acquire skills for collecting, mounting, and preserving insects for scientific study: Introduction to taxonomic key, Collecting, mounting, and preserving insects for scientific study; Basic insect management principles: Principles and methods of insect pest Management.

Practical Identification of Phylum Arthropod up to classes; Identification of types of mouthparts; Identification of types of antennae; Identification of types of wings; Modifications of insect abdomen; Dissecting a cockroach to identify the internal body systems; Study of different types of insect larvae and pupae; Identification of characters of different insect orders; Preparation insect identification key; Methods of collection and preservation of insects.

EA 21013 (3:30/30) Farm Power and Mechanization

Theory Traditional farming equipment: Various traditional farming equipment Power sources for farming activities: Various power sources for farming activities, animal/human power, wind power, hydro power, solar power, electric power, engine power, internal combustion engine (two and four stroke in petrol and diesel) and different operating systems (valve system, fuel system, cooling system, lubricating system, hydraulic system, ignition and electrical system, transmission system); Operation and maintenance of two and four wheeled tractors: Operation and maintenance of important farm machineries used in Sri Lanka; Operation

and maintenance of important farm machineries used in Sri Lanka; Water lifting devices for farming activities and their maintenance practices: classification of water lifting devices, Indigenous water lifting devices, positive displacement pumps, variable displacement pumps.

Practical Various traditional farming equipment**;** identify various traditional farming equipment and harnessing systems**;** alternative power sources**;** identify various parts of four stroke engine and their function**;** identify various operating systems of four stroke engine**;** identify various parts of two stroke engine and their function**;** identify various operating systems of two stroke engine**;** maintenance of two and four wheeled tractors**;** operation of two and four wheeled tractors**;** identify and use primary land preparation equipment**;** identify and use of secondary land preparation equipment**;** identify and use of crop establishment equipment**;** different plant protection equipment**;** identify and use of different plant protection equipment**;** identify and use of harvesting and threshing equipment**;** operation and maintenance of various kinds of pumps**;** measurement of pump performance.

EA 21024 (4:00/120) Field Practices in Crop Production

Practical Land preparation and soil conservation: Land clearing, Land preparation, Soil conservation, Land preparation equipment, Preparation of plots; Crop cultivation, crop growth management and harvesting: Nursery establishment, Different types of nursery, Field planting, growth management and harvesting of cereals, root and tuber crops, legumes, cash crops, vegetables and leafy vegetables, fruit crops; Pests, diseases and weeds: Identification and control pests, diseases and weeds of cereals, root and tuber crops, legumes, cash crops, leafy vegetables, fruit crops, Formulate agrochemicals (fertilizer and pesticides), Inter-cultivating equipment; Farm sustainability management: Farm waste handling, Farm sustainability management, Record keeping.

EA 21033 (3:30/30) Crop Physiology

Theory Explain the physiological processes and factors that regulate growth, developmental rates of dry matter accumulation in crops at canopy level: Physiological processes and regulating factors of growth, development and rate of dry matter accumulation; Demonstrate the ability to solve quantitative problems of crop growth analysis, and whole-canopy carbon fluxes: Crop growth analysis, and whole-canopy carbon fluxes; Analyze the quantitative and physiological basis of crop yield reduction due to resource capture and interplant competition effects: Resource optimization; Demonstrate the instrumentations for crop-environment interactions experiments: Overview of instrumentation and crop experimentation; Integrate and apply knowledge on crop physiology for analytical thinking and solving practical problems experienced in agricultural systems: Decision support

Practical Introduce the field experiment form groups; Introduce Projects; Report; Report presentation; instrumentation and measurements

EA 21041 (1:15/00) Rice Production Technology

Theory Introduction to rice cultivation in Sri Lanka: Rice cultivation in Sri Lanka and present status, Major rice cultivating Agro-ecological regions and cultivation systems in Sri Lanka, Classification of cultivated rice, Phenology of the rice plant, Taxonomic classification of cultivated rice, Classification of varieties according to the life cycle, Rice research stations and their special duties; Nursery and crop growth management: Nursery management techniques for Rice, Land preparation,planting and crop growth management practices; Yield components of Rice: Yield components, Physiology of rice plant maximize yield; Harvesting and post-harvesting operation: Harvesting, Processing, Storage

Practical Identification of rice plant parts and varieties; Identification of yield components

EA 22012 (2:15/30) Plantation Crop Production

Theory Biology of Tea, Rubber, Coconut and underdeveloped plantation crops: Biology of Tea, rubber plants, Coconut palm, underdeveloped plantation crops, Effects of biological features for yield maximization and crop improvement, Varieties, Clones and forms of Tea, Rubber, Coconut and other plantation crops Ecological requirements and basic crop management practices, Climatic and soil requirements of Tea, Rubber, Coconut and underdeveloped plantation crops, Nursery management for Tea, Rubber, Coconut and underdeveloped plantation crops; Characteristic features of traditional plantation crops: Characteristic features of tea, rubber and coconut, Identification of other plantation crops suitable for Sri Lanka, Management of large scale plantation industry, Management of small holder plantation; Processing of plantation crop products: Processing of tea, rubber, coconut and other plantation crops

Practical Identification of morphological features of different varieties, forms and clones; Field establishment, management and harvesting of Tea, Rubber, Coconut and underdeveloped plantation crops

6. DEPARTMENT OF EXPORT AGRICULTURE

6.1 Specialization Module: Agri -Environmental Resource Management

Courses of Specialization Programme Offered by the Module Agri -Environmental Resource Management

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year III Semester I	EA 31093	Soil Fertility and Fertilizers	(3:30/30)	Compulsory
	EA 31103	Surface and Groundwater Hydrology	(3:30/30)	
	EA 31113	Crop and Cropping System Modelling	(3:30/30)	
	EA 31123	Environmental Pollution and Conservation	(3:30/30)	
	EA 31132	Environmental Microbiology	(2:15/30)	
	EA 31142	Solid Waste Management	(2:15/30)	
Year III Semester II	EA 32012	Research Methodology and Seminar	(2:30/00)	Compulsory
	EA 32102	Ecophysiology	(2:15/15)	
	EA 32113	Soil Degradation and Conservation	(3:30/30)	
	EA 32122	Climate Change and Climate Modelling	(2:15/30)	
	EA 32132	Watershed Management and Modelling	(2:15/30)	
	EA 32142	Advanced Land and Water Resource Engineering	(2:15/30)	
	EA 32152	Environmental Impact Management in Agriculture	(2:15/30)	Elective
	EA 32162	Applied Green Technology in Agriculture	(2:15/30)	
	EA 32093	Controlled Environment Agriculture	(3:30/30)	
	EA 32172	Environmental Planning	(2:15/30)	

Courses of Specialization Programme Offered by the Agri -Environmental Resource Management (Cont.)

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year IV Semester I	EA 41072	Silviculture and Commercial Forestry	(2:15/30)	Compulsory
	EA 41083	Land Evaluation	(3:30/30)	
	EA 41092	Ecosystem Management	(2:15/30)	
	EA 41201	Research Project I	(1:00/100)	
	EA 41052	Conservation and Improvement of Genetic Resources	(2:15/30)	Elective
	EA 41102	Sustainable Soil Management	(2:15/30)	
	EA 41112	Climate Change, Agriculture and Food Security	(2:15/30)	
	EA 41062	Hybrid Seed Production	(2:15/30)	
	EA 41153	Post-Harvest Physiology and Technology of Horticultural Produce	(3:30/30)	
	EA 41162	Sustainable Farming Systems	(2:15/30)	
	EA 41172	Designing of Irrigation Systems in Commercial Agriculture	(2:15/30)	
	EA 41182	Export Promotion of Agricultural Produce	(2:15/30)	
	EA 41193	Alternative Commercial Enterprises	(3:30/30)	
Year IV Semester II	EA 42012	Industrial Training	(2:00/200*)	Compulsory
	EA 42025	Research Project II	(5:00/500*)	

* *Notional Hours*

Course Capsules of Courses of Module: Agri -Environmental Resource Management Offered by the Department of Export Agriculture

EA 31093 (3:30/30) Soil Fertility and Fertilizers

Theory Soil chemical properties: Soil colloids: Cation Exchange Capacity (CEC), Soil pH and Electrical conductivity, Soil redox potential (Eh),Buffering capacity, Soil quality management; Soil nutrient retention and losses: Factors affect on available nutrient concentration, Nutrient fixation in soil and other constraints on available nutrient Nutrient dynamics in root soil interface: Nutrient movement in root rhyzosphere, Nutrient cycles, Nitrification and denitrification, Mineralization, Reclamation of degraded lands; Nutrient sources on crop production: Organic matter decomposition, C/N and C/P ratio, Inorganic and organic fertilizers.

Practical Determination of CEC; Determination of soil pH and Electrical conductivity; Organic matter determination; Determination of available soil nitrogen; Determination of available soil phosphorus using Olsen method; Analysis of exchangeable potassium in soil using Atomic absorption spectrophotometer; field observation of degraded lands and suggesting solutions; observation of physical and chemical characters of inorganic and organic fertilizers.

EA 31103 (3:30/30) Surface and Groundwater Hydrology

Theory Occurrence and movements of groundwater: introduction to groundwater hydrology, occurrence of ground water; forces acting on ground water, soil water movements under saturated and unsaturated conditions; Aquifers: aquifers, aquifer classification, aquifer characteristics; Darcy's law: Darcy's Law; hydraulic conductivity; coefficient of permeability (k), groundwater investigation, Homogeneity and Isotropy, Transmissivity (T); Well hydraulics: well hydraulics, steady flow toward a well in confined and unconfident aquifers, types of wells and their construction, well completion; Use and manage the groundwater reservoir effectively: Use groundwater effectively.

Practical Groundwater hydrology; forces acting on groundwater, soil water movement under saturated and unsaturated conditions; aquifers, aquifer classification, aquifer characteristics, determination of hydraulic conductivity; calculations on darcy's law; hydraulic conductivity; coefficient of permeability (k); well hydraulics, steady flow toward a well in confined and unconfident aquifers; calculations on well hydraulics; groundwater conjunctive use; groundwater quality and pollution.

EA 31113 (3:30/30) Crop and Cropping System Modelling

Theory Explain the basic functions and flows of a dynamic crop model: Basic functions and flows of a dynamic crop model; Analyse practical approaches to crop modelling for management decisions: Introduction to systems approaches; Demonstrate various components in DSSAT/APSIM file system to simulate the potential production: Overview of DSSAT/APSIM models; Calibrate the DSSAT/APSIM model for genetic coefficients from sample data sets and statistical approaches for model

evaluation: Model Calibration and Model Evaluation; Simulate the crop growth and development under abiotic and biotic stress to evaluate the model uncertainty: Simulation of water and N-limited growth; Explain process flow of a cereal-legume intercropping system based on the individual crop simulation modelling approaches: Simulation of water and N-limited growth.

Practical Introduce Projects; DSSAT and APSIM interfaces; Genetic coefficient estimations, Model calibration and evaluation runs, data entry, Input file preparations; Soil file.

EA 31123 (3:30/30) Environmental Pollution and Conservation

Theory Fundamentals of Environment and pollution: Major types of pollution: Sources of pollution; Environmental impacts of pollution: Monitoring, analyzing and mitigating pollution: Monitoring, analyzing and mitigating environmental impacts; Management of environmental pollution and its impacts: Management of agricultural environmental pollution and its conservation

Practical Identify different types and sources of pollution; Identification of environmental impacts created by pollution

EA 31132 (2:15/30) Environmental Microbiology

Theory History and frequently used Microbial terminology and importance of microorganisms: Microbiology terminology and importance of microorganisms; Environmental microbiological concepts, including microbial ecology, microbial groups, identities and roles of microorganisms in environment: Environmental microbiological concepts: Microbiology of water and wastewater treatment, solid waste transformation, soil remediation and air purification: Microbiology of water and wastewater treatment; Important groups of microbes to increase crop production.

Practical Laboratory safety, microscopy, aseptic technique;microbial community analysis, acid microbial community analysis; clean water analysis by standard methods membrane filter technique defined substrate technology (DST) colilert® presence/ absence test; microbial biodegradation microbial biodegradation of petroleum biodegradation, Culture preparation an inoculation.

EA 31142 (2:15/30) Solid Waste Management

Theory Introduction to SWM: Introduction, Problems under international and national levels, Classification of Solid Waste; Management of solid waste: Management of solid waste, Storage, Collection and transportation, Separation; Minimizing waste generation: Concept of zero waste model; Reusing and recycling: Exploiting possibilities, Methods; Composting: Municipal waste, Sewage sludge, Adulteration, Economic aspect.

Practical Field practical of solid waste management

EA 32012 (2:30/00) Research Methodology and Seminar

Theory Introduction: Objectives of research, Classification of research, Kinds of research, Research methods and research methodology; Scientific writing: Thesis, Standard scientific research paper components; Proposal formulation: How to make research proposal, Content of a research proposal; How to conduct research: Problems faced during research, How to do effective research presentation in seminars.

EA 32102 (2:15/15) Ecophysiology

Theory Explain which are the key environmental influences on crops/trees: Introduction and key environmental factors affect on crop growth; Evaluate how photosynthesis, stomatal conductance, transpiration, water relations, and below ground processes are influenced by environmental variability: Crop growth analysis, and whole-canopy carbon fluxes; Explain the mechanism of nutrient cycling in soil-plant-atmosphere continuum: Nutrient dynamics; Analyze the current and future impact of global change on crop productivity: Overview of climate change, plant responses to climate change with recent research evidences

Practical Individual projects

Tutorial Calculations and graphs: Ecosystems: Climate change impact on crop productivity

EA 32113 (3:30/30) Soil Degradation and Conservation

Theory Problem soils: Optimum Soil conditions, Acid soils, Calcareous soils, Histosols (Peat soils, Bog soils and Half bog soils), Salt affected soils, salt sources, Sodic Soil, Sandy soils, Steep lands, Vertisols, Soil compaction, eroded lands, Causes for problem soils;Fundamentals of soil degradation:The energy concept of soils, A process in space and time and basic concepts, Soil crusting, degradation through land use: A general approach, Hydrologic cycle, Soil erosion, rainfall and runoff energy concept; Management strategies to conserve productive soils: Soil quality and sustainability, Low productive and high productive soils, Strategies to overcome soil pollution and contamination, Soil and water conservation strategies; Based on SALT, Reclamation of different problem soils by ameliorating; Sustainability of management strategies: Concept from sustainability, economic viability of different strategies, Sustainable agronomic practices for soil conservation, Management strategies to conserve soil water reservoir and water quality.

Practical Field observations of problem soils; study the climatic conditions that adversely affect on productive soils; Field observation of low productive and high productive lands; observation of sustainable management strategies of low productive soils.

EA 32122 (2:15/30) Climate Change and Climate Modelling

Theory Climate system: definitions for climate, climate system and climate change, radiation process, characteristics of climate system components, feedback in the climate system, global nature of the climate system, Oscillation, regional nature of the climate system; Natural temporal variability in the climate system: basic forcing mechanism, external, interaction of climate system components, observed

climate variability; Human impacts on the climate system: atmospheric greenhouse gas enhancement, atmospheric aerosol enhancement, change of radiative effects of clouds, change of radiative properties of the land surface, human impacts; Modelling, detection, and attribution of recent and future climate change: Modelling climate change; Prediction the climate change and describe observation for long term climate monitoring: Climate prediction Potential impacts on climate change: Climate prediction.

Practical Human impacts on climate change, Study on climate models, Work with climate models, Climate change forecasting, Practice with statistical downscaling techniques, Long term climate monitoring, self-study on potential impacts of climate change.

EA 32132 (2:15/30) Watershed Management and Modelling

Theory Basic concepts of watershed: introduction to watershed management, different stakeholders and their relative importance, watershed management policies and decision making; Sustainable watershed management practices: sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, soil erosion and conservation; watershed management practices in arid and semiarid regions, short term and long term strategic planning, introduction to integrated approach, integrated water resources management, conjunctive use of water resources, rainwater harvesting; roof catchment system; Watershed management and modelling: Modelling the watershed; Social aspects of watershed management: community participation, private sector participation, institutional issues, socio-economy, integrated development, water legislation and implementations; Water quality management: water quality and pollution, types and sources of pollution, water quality modelling, environmental guidelines for water quality, perspective on recycle and reuse, waste water reclamation; Flood and drought management: storm water management, design of drainage system, flood routing through channels and reservoir, flood control and reservoir operation, case studies on flood damage, drought assessment and classification, drought analysis techniques, drought mitigation planning.

Practical Watershed management and policies, watershed management in various regions; sustainable watershed management; short term and long term planning; integrated watershed management approaches; rainwater harvesting approaches; watershed modelling approaches; modelling of rainfall-runoff process; application of GIS and RS in watershed management; social aspect of watershed management; water quality modelling approaches; calculations on flood routing, reservoir operation; drought analyzing; drought mitigating planning.

EA 32142 (2:15/30) Advanced Land and Water Resource Engineering

Theory Fundamentals of fluid mechanics: introduction to water resources engineering, design of water sources systems, fundamentals of fluid mechanics, physical properties of water, fluid statics, fluid kinematics, fluid dynamics; Flows in closed conduits and open channels: single pipeline, multiple pipelines, pumps (affinity law,

operating point, limits on pump location, multiple-pump systems, design of water distribution systems (components of distribution system, water demand, pipelines, operating criteria for water distribution systems, network analysis, flow in open channels, basic principles, water surface profiles, hydraulic structures, design of open channels, design of sanitary-sewer systems; Analyze hydrological data: probability and statistics in water resources engineering, probability distribution, analysis of hydrological data, floods; Management of problem soils: agricultural land classification, problem soils.

Tutorial calculations on fluid mechanics; calculations on closed conduits and open channels; analyzing hydrological data; calculations on land reclamation.

Practical Identification and management of problem soils

EA 32152 (2:15/30) Environmental Impact Management in Agriculture

Theory Human impact on environment: Introduction,definition of terms, examples, annotation of the importance of understanding and managing environmental impact; Activities contributing to damage the environment and remedial measures: Identification of the activities contributing to damage the environment, Sources, Paths, Rates, Trends and remedies; Intensive agriculture on the hotspot: Impact of Tillage and land use, Agrochemicals,Including Fertilizers, Polycyclic Aromatic Hydrocarbons (PAHs) mainly released by Agro-machineries, Monoculture; Educating people on the importance of EIM: Effective Transfer of Knowledge, Designing and Conducting Awareness Programmes.

Practical Field practical; demonstration in a country-side and presenting ideas of environmental impact

EA 32162 (2:15/30) Applied Green Technology in Agriculture

Theory Environment and sustainability: Concept of agricultural system and its environment, Climate change and its impact on agriculture; Agriculture and resource use: Resources and pollutant, resources and use efficiencies; Green technologies and its application in agriculture: Green technologies to enhance sustainability, Green energy in agriculture, Waste management in agriculture, Management of pesticide, Soil management, Other application in agriculture; Laws and regulations: Global movement toward green technology, Legal framework to ensure sustainable development of agriculture sector.

Practical Identification of different energy inputs and energy flow in agricultural system; estimation of resource use efficiencies; Identification and demonstrations of applied green technologies

EA 32093 (3:30/30) Controlled Environment Agriculture

Theory Potential and drawbacks in the controlled environment agriculture in national and global context: Introduction to protected agriculture, Present status of national and global protected agriculture; Structural and environmental conditions

in controlled environment agriculture and different cultivation techniques: Greenhouse construction, Controlling of climatic conditions, Soilless culture system; Horticultural crop management under controlled environment agriculture and cost benefits analysis of an enterprise: management of crops under protected agriculture systems, nutrient solutions for soilless culture, post-harvest handling of high value crops, cost benefit analysis and preparation of a budget for greenhouse venture.

Practical Identification of construction materials for a protected house; nursery management of high value crops; preparation of nutrient solutions; cultivation and management of plants under greenhouse conditions; analyze the cost / benefit of an enterprise.

EA 32172 (2:15/30) Environmental Planning

Theory Introduction to environmental planning: Introduction, Criteria; Environmental planning for sustainable development: Management of solid waste, Relationships; Procedure in environmental planning: Approach;Environmental planning for agriculture: Areas of concern, Remedial measures

Practical Field practical in an agro-ecosystem; Observatory field practical; Studying bad and good systems

EA 41072 (2:15/30) Silviculture and Commercial Forestry

Theory Introduction to silviculture and commercial forestry: definitions, importance, present local and international condition of the silviculture and commercial forestry, Evolution of the silviculture and commercial forestry, Importance of silviculture and commercial forestry, Potential and drawbacks of silviculture and commercial forestry; Classification and management of forestry and silvicultural systems: Classification of forestry and silvicultural systems, Nursery management, Field establishment, Tree management, Harvesting; Agroforestry systems and their interactions; Classification of agroforestry systems, Different agroforestry systems, Crop tree interface of the Agroforestry systems Deforestation: Deforestation of forests, Deterioration of natural cycles of forest ecosystems, Remedial measures.

Practical Visits to the plantation forestry; visits to the Agroforestry systems to identify characteristics of the systems.

EA 41083 (3:30/30) Land Evaluation

Theory Introduction to land evaluation methods for (physical) land suitability assessment: Land evaluation; Principles of land evaluation: Rules, guide, and different aspect; Land suitability/ capability, Introduction; Land quality: Prediction; Different aspects of land quality: hydrological features, socio-economic factors and environmental and health aspects

Practical Field practical; Soil testing for practical indicators, field observation; Studying the methods of using indicators of land quality; Observation and understanding on how to relate land quality to each of those

EA 41092 (2:15/30) Ecosystem Management

Theory Introduction to Ecosystem: definition, importance of ecosystems, diversity, common and specific features of general ecosystems, Different types of ecosystem, Functions of ecosystem, Agricultural ecosystems; Ecosystem Management: Ecological responses, Ecosystem and agricultural production, Ecosystem management, Sustainable ecosystem management; Ecosystem management for disturbance ecology: Problems associated with ecological responses and agricultural production, Ecosystems for resistance and resilience; Conservation of different ecosystems: Adaptation and mitigation of ecosystem changes, Deterioration of ecosystems, Conservation of ecosystems, Assessment and evaluation of ecosystem.

EA 41201 (1:00/100*) Research Project I

Identify a research area, define research problem; Reviewing literature and establish research framework; Define research objectives & research questions; Identify the research methodology; Proposal writing; Proposal presentation and submission of final draft.

EA 41052 (2:15/30) Conservation and Improvement of Genetic Resources

Theory Theoretical and historical aspects of genetic resources, canter of origin of crops and their evolution: Introduction, Centre of origin and evolution of crops, Wild relatives of crops, Brief history of genetic resource conservation, Practical assignment; Natural and human processes creating and eroding biodiversity and genetic resources, domestication regions of major agricultural and horticultural crops: Loss of plant diversity, Genetic resources, Select important crops and their situation in genetic diversity, Molecular approach for Genetic resources conservation; Conserve and manage genetic resources, make ethic considerations related to conservation and use of biodiversity and genetic resources, evaluate genetic resources for future need: Objectives for conservation of animal/plant biodiversity, Techniques for conservation of genetic resources, Conservation strategies, Database Management for Gene banks, Global aspects of genetic diversity.

Practical Situation of genetic diversity of selected crops; Molecular methods for genetic diversity; seed germination, tissue culture, cryopreservation.

EA 41102 (2:15/30) Sustainable Soil Management

Theory The environmental, political, social and economic dimension of soil use and management: Sustainability, Soil Resource; Soil management: Soil Quality, Soil health, Monitoring soil sustainability for intended uses; Methods and tools for sustainable soil management: Participatory Planning Approaches, Indicators, Soil assessment; Soil conservation and rehabilitation: Soil Degradation; Application of soil test results in soil conservation and rehabilitation: Soil Test.

Practical Field practical on soil use; soil testing; studying the methods of using indicators

* *Notional Hours*

of soil quality and health in farming; key soil properties affecting soil quality and health.

EA 41112 (2:15/30) Climate Change, Agriculture and Food Security

Theory Explain Climate Change, Agriculture & Global Food Security: Overview of Climate change, agriculture and global food security; Evaluate the policy and scenarios for climate change adaptation and mitigation: Policy scenarios for climate change; Analyze the techniques and models in science communications of climate change and food security: Science communications of climate change and food security

Practical Individual projects related to Climate Change, Agriculture & Global Food Security

Tutorial Policy scenarios for climate change, Research projects

EA 41062 (2:15/30) Hybrid Seed Production

Theory Introduction to hybrid seeds, Trends and present status of hybrid seed production, Mechanism for cross pollination, Mechanism for self-pollination, Requisites of hybrid seed production, Characteristics of parental lines, Hybrid seeds; Maize hybrid seed production: Introduction to maize hybrid seeds, Maize Flowers Structure, Factors determine the success and quality of hybrid seed production, Seed production, Seed production Practical: Maize breeding; Rice hybrid seed production: Introduction to rice hybrid seed production, Rice Flowers Structure, seed and grain, Hybrid rice parental lines, Synchronization of flowering, Selection of CMS multiplication and hybrid seed production fields, Panicle initiation and flowering date, Other management practices, seed production; Hybrid seed production in vegetable: Introduction to hybrid seed production in Vegetable, Variation in flower structure of vegetables, Sex Expression, Pollination and Hybridization Techniques, Seed production; Introduction to hybrid flower seed production: Introduction to hybrid flower seed production, Variation in flower structure of different flowers, pollination and Hybridization Techniques, seed production

Practical Breeding; mother plant establishment, pollination, seed production; mother plant establishment, pollination, seed production

EA 41153 (3:30/30) Post-Harvest Physiology and Technology of Horticultural Produce

Theory Importance of postharvest management of horticultural produce: Present status of postharvest losses of horticultural commodities in Sri Lanka vs. World and countries in the Asian region, Postharvest management of horticultural produce to assure food security and food safety, Reasons for high postharvest losses in Sri Lanka; National and international quality standards of horticultural produce: Setting standards for horticultural produce; Factors affecting quality and life of harvested horticultural produce and their relationships with physiology of the produce: Common market chains of horticultural produce, Channels of food losses, Structure and composition of fruits, vegetables and floricultural items in

relation to their post-harvest life, Postharvest biochemistry and physiology of horticultural produce, Major causes of postharvest losses; How to achieve desired quality standards in pre-harvest, harvesting and post-harvest stages of the crops?: Pre-harvest, harvesting, postharvest management to assure postharvest quality and extended postharvest life, Postharvest commodity treatments; Selected techniques in maturity indexing, harvesting, artificial fruit ripening, packaging and quality evaluation and suggestions to improve such techniques: Maturity indices, Harvesting techniques, Artificial ripening techniques of fruits, Packaging techniques, Quality evaluation of harvested produce; Value addition and market presentation techniques of horticultural commodities to cater the changing consumer demand: 'Minimal processing'/ 'fresh-cuts' of horticultural produce, Market presentation of horticultural produce, Latest advances in value addition and market presentation of horticultural commodities.

Practical Importance of postharvest management of horticultural produce; Quality standards of fresh produce; Assessment of causes of postharvest losses at the village fair; Market survey- Postharvest losses of a given commodity; Post-harvest diseases and disorders of horticultural products; Commodity treatments; Maturity indexing; Harvesting techniques; Commodity treatments- Ripening management; Evaluation, improvement and designing of some selected harvesting tools and packaging materials; Value addition and improvement of market presentation of some selected commodities.

EA 41162 (2:15/30) Sustainable Farming Systems

Theory Introduction to the history of agriculture: definition of terms; Ethics and fundamental principles of sustainable farming systems and its relationship to sustainable food, fiber, and seed production; Sustainable farming – an alternative to intensive farming: Examine the Biological, Economic and Ethical Dimensions of Designing Small-scale Farms or Market-based Eco-agriculture Garden Systems, Agricultural Civilizations, Farming Systems; Concepts: Eco-agriculture Garden Design and Management, Seed Selection and Seedling Production.

Practical Traditional farming (chena); farm practice

EA 41172 (2:15/30) Designing of Irrigation Systems in Commercial Agriculture

Theory Soil water conservation strategies: Management strategies to conserve soil water status in low productive soil profiles and rainwater harvesting, Soil moisture measurements and moisture characteristic curve; Design suitable irrigation systems: Preliminary requirements to design a suitable drip irrigation system, Site evaluation, Crop water requirements, Environmental factors affecting the design, Wetting pattern and number of drippers, Actual and potential evapotranspiration, Effective root zone for water uptake; Irrigation efficiencies: Methods of irrigation and irrigation efficiencies, Gross and net irrigation at readily available water fraction, Irrigation interval and frequencies for different soils; Maintenance of Irrigation System: Maintenance of Micro Irrigation System, Design a suitable irrigation system for sustainable crop production.

Practical Evaluation of soil moisture conservation practices; use of soil moisture instruments Study the designed parameters; comparison studies of irrigation efficiencies of different methods; observation of major problems of micro-irrigation systems; suggesting appropriate solutions for trouble shootings.

EA 41182 (2:15/30) Export Promotion of Agricultural Produce

Theory Export potential of Sri Lankan agricultural products and other potential products for new introductions: Present status of local, regional and global agricultural product trade, Major markets and niche markets for various agricultural products, Potential for expansion of Sri Lankan agricultural exports; International quality standards of agricultural produce: General quality standards for different products, Quality standards for important specific markets; Basic elements of the export business of agricultural produce; Issues and challenges in exporting agricultural produce to different markets: Issues and challenges, Strategies to overcome them; Action plan for the export promotion of agricultural products.

Practical SWOT analysis for Sri Lankan agricultural exports; Visiting and evaluation of an export oriented agriculture company based on these elements;Formulation of an action plan for the export promotion of an identified agricultural produce.

EA 41193 (3:30/30) Alternative Commercial Enterprises

Theory Apiculture and different casts in honeybee population: Introduction to apiculture and honey bees, Different cast of bees in the colony, Division of labour and functional specialization, Different communication methods of bees; Handling practices of honey bee population for honey production: Bee comb hive and its management, other beekeeping appliances, Bee colony management; Cultivate mushroom in a commercial manner: Introduction to mushroom cultivation, Mushroom, Requirements for mushroom cultivation, Mushroom seeds preparation, Mushroom cultivation; Advice to develop a commercial nursery for horticultural crops: Introduction to commercial nursery, Commercial Nursery, selection of planting materials, Management of Nursery.

Practical Identifications of bees, different cast, collect natural bee colonies; Maintain bee colony, handling of bee colony, honey extraction, experiments; Mushroom cultivation; Mushroom media preparation, inoculation of mushroom seeds, harvesting.

EA 42012 (2:00/200*) Industrial Training

Training in particular industry under the supervision of external and internal supervisors.

* *Notional Hours*

EA 42025 (5:00/500*) Research Project II

Proposed methodology establishment, treatment application, data collection and analysis, write up thesis findings; Presentation of research findings and finalizing the thesis.

* *Notional Hours*

6. DEPARTMENT OF EXPORT AGRICULTURE

6.2 Specialization Module: Crop Production Technology

Courses of Specialization Programme Offered by the Module Crop Production Technology

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year III Semester I	EA 31152	Export Agricultural Crop Production	(2:15/30)	Compulsory
	EA 31162	Commercial Vegetable Production	(2:15/30)	
	EA 31172	Field Crop Production	(2:15/30)	
	EA 31183	Production and Processing of Plantation Crops I	(3:30/30)	
	EA 31192	Commercial Floriculture I	(2:15/30)	
	EA 31093	Soil Fertility and Fertilizers	(3:30/30)	
	EA 31072	Molecular Genetics	(2:15/30)	
	EA 31023	Insect Pests of Crops and Management	(3:30/60)	
Year III Semester II	EA 32012	Research Methodology and Seminar	(2:30/00)	Compulsory
	EA 32183	Production and Processing of Plantation Crops II	(3:30/30)	
	EA 32192	Fruit Production Technology	(2:15/30)	
	EA 32093	Controlled Environment Agriculture	(3:30/30)	
	EA 32023	Diseases of Crops and Management	(3:30/60)	
	EA 32202	Alternative Energy Production	(2:15/30)	Elective
	EA 32032	Plant Cell and Tissue Engineering	(2:15/30)	
	EA 32082	Seed Production Technology	(2:15/30)	
	EA 32252	GIS and Remote Sensing in Agriculture	(2:15/30)	

Courses of Specialization Programme Offered by the Module Crop Production Technology (Cont.)

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year IV Semester I	EA 41123	Landscape Horticulture and Architecture	(3:15/60)	Compulsory
	EA 41132	Commercial Floriculture II	(2:15/30)	
	EA 41142	Urban Horticulture	(2:15/30)	
	EA 41201	Research Project I	(1:00/100*)	
	EA 41042	Stress Physiology	(2:15/30)	Elective
	EA 41052	Conservation and Improvement of Genetic Resources	(2:15/30)	
	EA 41062	Hybrid Seed Production	(2:15/30)	
	EA 41112	Climate Change, Agriculture and Food Security	(2:15/30)	
	EA 41153	Post-Harvest Physiology and Technology of Horticultural Produce	(3:30/30)	
	EA 41162	Sustainable Farming Systems	(2:15/30)	
	EA 41172	Designing of Irrigation Systems in Commercial Agriculture	(2:15/30)	
	EA 41182	Export Promotion of Agricultural Produce	(2:15/30)	
	EA 41193	Alternative Commercial Enterprises	(3:30/30)	
Year IV Semester II	EA 42012	Industrial Training	(2:00/200*)	Compulsory
	EA 42025	Research Project II	(5:00/500*)	

* *Notional Hours*

Course Capsules of Courses of Module: Crop Production Technology Offered by the Department of Export Agriculture

EA 31152 (2:15/30) Export Agricultural Crop Production

Theory Diversity, common and specific features of crops, climatic suitability and value of the export agricultural crops: Identify the species diversity, Common and specific features of crops, Climatic suitability and value of the export agricultural crops; Agronomic and management practices involved in spices, beverages, fibre and oil crops: Planting material production and nursery management important in multiplication, Field establishment and common and specific crop growth management practices, Determination of harvesting indices and harvesting practices, Nutrient management for export agricultural crops, Pest and disease management; Processing and value addition techniques: Post-harvesting practices and management, Quality improvement techniques involve in post-harvest, Processing of spices, beverages, fibre and oil crops; Local and international quality standards of export agricultural crops: local and international standards of export agricultural products, Novel technologies improve product diversity and value addition; Potentials of crop- and product-diversification for sustainable income: Assess the potentials to utilize the diversity, Improve the genetic base of these crops, Crops and product diversification, Potentials to utilize marginal and low productive lands for cultivation

Practical Identify the species diversity; Develop a new product

EA 31162 (2:15/30) Commercial Vegetable Production

Theory National and global technological advances, potential and drawbacks and proposed solutions: Introduction to vegetable crops; Environmental factors and management practices affecting the quantitative and qualitative yield: Environmental requirements in vegetable cultivation; The vegetable based cropping systems: Vegetable based cropping systems; Demonstrate the selected horticultural practices involved in vegetable crop production: Cultivation of solanacea, brasicasiae, malvasea, fabacea vegetable crops; Different vegetable processing techniques: Processing techniques of vegetable; Policies and supportive services in relation to vegetable crop production: Policies and supportive services.

Practical Identification of exotic and local vegetable crops and their varieties; Survey on vegetable cultivation aspects in a selected area; Group discussion on remedial measures for problems related to vegetable cultivation in Sri Lanka; Identification of Technological advances in vegetable cultivation in relation to management of climatic requirements; Demonstration of different vegetable based cropping systems in Sri Lanka at faculty farm; Cultivation of selected vegetable crops; Processing of selected vegetable crops.

EA 31172 (2:15/30) Field Crop Production

Theory Introduction to Field crops: definition, classification, examples, importance, diversity, Field crop cultivation in Sri Lanka and present status, Common and specific features of crops, Climatic suitability and value of the field crops, field crop research stations and their special duties; Crop growth management and harvesting: Planting material production and nursery management important in multiplication, Field establishment and common and specific crop growth management practices, determination of harvesting indices and harvesting practices, nutrient and water management for field crops, Pest and disease management; Yield components and physiological behaviour of field crops: Yield components, Physiology of cereals to maximize yield, Physiology of root and tuber crops to maximize yield, Physiology of sugar and oil crops to maximize yield, Physiology of fibre crops to maximize yield, Physiology of legumes to maximize yield; Post-harvest and processing practices: Post-harvesting practices and management, Processing, Storage.

Practical Identification of problems and potentials of field crop production; Identification of the species diversity and their characters; land preparation and Planting; Management of crop; Identification of harvesting indices and harvesting equipment; Identification of yield components; Identification of special features of cereals to maximize yield; Identification of processing steps and equipment.

EA 31183 (3:30/30) Production and Processing of Plantation Crops I

Theory Planting material production and Field establishment: Planting material production by vegetative methods, Nursery management practices, Land management for plantation crop production, Land preparation practices, Soil rehabilitation and soil conservation, Field establishment; Crop growth management: Intra-cultivation practices of tea, rubber, coconut and underdeveloped plantation crops, Harvesting practices of tea, Harvesting practices of rubber, Harvesting practices of coconut, Harvesting practices of sugarcane and oil palm, Pest and disease management of Tea, Rubber, Coconut and underdeveloped plantation crops;
Physiology of plantation crop production: Physiology of tea plant growth and shoot generation, Physiology of Latex synthesis and harvesting, Physiology of flowering, nut formation and plant growth of coconut and oil palm, Physiology of synthesis, accumulation, crop growth and maturation of sugarcane; Plantation crop management strategies: Overcome problems associated with present cultural practices, Alternative solutions to improve physiological functions, Plantation crop based intercropping, Minimize crop losses in plantation sector.

Practical Nursery establishment; Identification of land preparation activities; Identification of Intra-cultivation and harvesting practices of tea, rubber, coconut and underdeveloped plantation crops; Identification of Pest and disease of Tea, Rubber, Coconut and underdeveloped plantation crops.

EA 31192 (2:15/30) Commercial Floriculture I

Theory Status of local and world floriculture industry: World trade and Sri Lankan status in floriculture industry, Potential areas in floriculture, important for Sri Lanka;

Elements of a successful floriculture business; Major potential ornamental potted plants and landscape plants and their environmental requirements: Major potted ornamental and landscape plant families and species/ varieties, Climatic and soil requirements; Propagation, establishment and crop management practices of major potted ornamental plants and landscape plants: Propagation of these plants for commercial production, Establishment of these plants, Crop management practices with special emphasis on special horticultural practices; Strategies to enhance value addition and market presentability of locally produced floricultural items: Requirement of improving market presentability and value addition, Potential improvements for the existing forms of items, New innovative products and value addition to attract buyers; Floristry and indoor gardening as small scale/ medium scale enterprises and demonstration of required skills as an entrepreneur in respective fields: Potential of floristry and indoor gardening as enterprises, Art and science of floristry and indoor gardening, Required skills in respective field, Innovative ideas and designs in floral arrangements and indoor gardening.

Practical Case studies on medium/ large-scale floriculture businesses; Identification of major ornamental potted plants and landscape plants; Propagation and establishment of major ornamental potted and landscape plants; Special horticultural management practices; Field visit s to large-scale and medium-scale ornamental plant nurseries; Value addition of locally produced floricultural items; Improving market presentability of locally produced floricultural items; Indoor gardening; Basics of floristry; Floral designs and arrangements; Exhibition.

EA 31093 (3:30/30) Soil Fertility and Fertilizers

Theory Soil chemical properties: Soil colloids, Cation Exchange Capacity (CEC), Soil pH and Electrical conductivity, Soil redox potential (Eh), Buffering capacity, Soil quality management; Soil nutrient retention and losses: Factors affect on available nutrient concentration, Nutrient fixation in soil and other constraints on available nutrient; Nutrient dynamics in root soil interface: Nutrient movement in root rhyzosphere, Nutrient cycles, Nitrification and denitrification, Mineralization, Reclamation of degraded lands; Nutrient sources on crop production: Organic matter decomposition, C/N and C/P ratio, Inorganic and organic fertilizers.

Practical Determination of CEC; Determination of soil pH and Electrical conductivity; Organic matter determination; Determination of available soil nitrogen;Determination of available soil phosphorus using Olsen method; Self-studies Analysis of exchangeable potassium in soil using Atomic absorption spectrophotometer; Self-studies; field observation of degraded lands and suggesting solutions; observation of physical and chemical characters of inorganic and organic fertilizers.

EA 31072 (2:15/30) Molecular Genetics

Theory Introduction to Molecular genetics: Introduction to Molecular genetics, Nucleic acids and proteins; Gene structure, transcription, translation and regulation of gene expression: Gene structure, transcription and translation by the three RNA polymerases, The structure and roles of RNAs and Proteins, Regulation of transcription and translation, Genetic codes for proteins and the various response

elements controlling transcription, Inducing factors, Gene silencing; DNA Damage, repair and recombination: DNA Damage, repair and recombination, Photoreactivation; Transposons, retrotransposons, and retroviruses: Non-Mendelian genetics encompassed in somatically mobile DNA; Social issues in molecular genetics.

Practical Introduction to lab materials; use of PCR machine, molecular detection of DNA damage, Gene sequencing.

EA 31023 (3:30/60) Insect Pests of Crops and Management

Theory Bionomics of agricultural pests: introduction, bionomics of insect pest of agricultural crops; Insect pests of agricultural crops: Common Pests of agricultural crops, insect pests of plantation crops, insect pests of export agricultural crops, insect pests of field crops, insect pests of vegetable crops, insect pests of greenhouse crops (protected crop), insect pests of fruit crops, insect pests of stored products, insects pests of floricultural crops; Control methods of insect pests of crops: application of pest control strategies for control agricultural crops based on principles of pest management, legislative methods, physical methods, cultural methods, crop plant resistance to pest attack, biological control, chemical control, integrated control

Practical Identification of pests of agricultural crops

EA 32012 (2:30/00) Research Methodology and Seminar

Theory Introduction: what is research, specific characteristics of research, Objectives of research, Classification of research, Kinds of research, Research methods and research methodology; Scientific writing: Scientific writing, Thesis, Standard scientific research paper components; Proposal formulation:How to make research proposal, Content of a research proposal; How to conduct research: How to conduct research effectively, Problems faced during research, How to do effective research presentation in seminars.

EA 32183 (3:30/30) Production and Processing of Plantation Crops II

Theory Introduction to plantation crop products: Handling of raw materials of different plantation crops, Classification, Importance of product diversification and value addition; Processing of fermented, non fermented, semi-fermented tea, Processing of RSS, Crepe rubber, TSR and concentrated latex products, Processing of coconut, Manufacturing of sugar and sugar based products, Extraction of palm oil from oil palm, Value added products of tea and coconut, Value added products of rubber and sugarcane; Quality management: Quality management techniques involve in different manufacturing steps, Chemical and physiological processes, Local and international grading systems; Modern technological advances: modern technological advances of tea, rubber and coconut processing sector, power saving technologies, Waste management, Quality certification, Computerized and automated factory management systems

Practical Processing of value added products; Identification of different grades and their quality parameters.

EA 32192 (2:15/30) Fruit Production Technology

Theory Introduction to fruit crops: Introduction, Botany of fruits, Classification of fruit crops, Present status of the National and global Fruit industry, Establishing a commercial orchard, Nursery, Propagation techniques; Fruit crops: Details of fruit crops, Introduction of underutilized fruit crops in Sri Lanka, Nursery establishments, preparation of an orchard plan, Identification of Characters of different fruit crops and their cultivars.

Practical Nursery establishments, preparation of an orchard plan; Identification of Characters of different fruit crops and their cultivars.

EA 32093 (3:30/30) Controlled Environment Agriculture

Theory Potential and drawbacks in the controlled environment agriculture in national and global context: Introduction to protected agriculture, Present status of national and global protected agriculture; Structural and environmental conditions in controlled environment agriculture and different cultivation techniques: Greenhouse construction, Controlling of climatic conditions, Soilless culture system;
Horticultural crop management under controlled environment agriculture and cost benefits analysis of an enterprise: management of crops under protected agriculture systems: nutrient solutions for soilless culture: post harvest handling of high value crops: cost benefit analysis and preparation of a budget for greenhouse venture.

Practical Identification of construction materials for a protected house; nursery management of high value crops;preparation of nutrient solutions; cultivation and management of plants under greenhouse conditions; analyze the cost/ benefit of an enterprise.

EA 32023 (3:30/60) Diseases of Crops and Management

Theory Diseases of field crops, vegetable crops, fruit crops, plantation crops,diversified crops, ornamental plants and rice: Diseases of other important crops.

Practical Identification of diseases.

EA 32202 (2:15/30) Alternative Energy Production

Theory Potential energy sources: Various energy sources; Biomass as an energy source: Biomass as an energy source; Various alternative energy sources such as solar, wind, tidal, wave, oceanic heat, geothermal heat, hydropower, hydrogen, nuclear: Alternative energy sources.

Practical Various energy sources;biomass energy conversion; charcoal production; bio diesel production; solar energy, wind energy tidal energy, wave energy, oceanic heat, geothermal energy, hydro power, hydrogen fuel cells, nuclear fusion

EA 32032 (2:15/30) Plant Cell and Tissue Engineering

Theory Introduction to plant tissue culture: Introduction to plant cell and tissue culture, Tissue culture laboratory and equipment, Clonal propagation system; Plant tissue culture techniques: Plant tissue culture techniques and their application in plant biotechnology, Types and purpose of culture; Crop improvement techniques: Production of new cultivars, Stages of micropropagation;Secondary metabolites: Introduction to secondary metabolites, Production of secondary metabolites; Cryopreservation: Cryopreservation for germplasm conservation, Plant cryopreservation protocols.

Practical demonstrations on equipment in the tissue culture laboratory; orchid seed culture, callus culture, regeneration techniques, anther culture with monocots and dicots, Isolation of proptoplasts and protoplast fusion; suspension culture from calli of rice.

EA 32082 (2:15/30) Seed Production Technology

Theory Seed sector, Seed Act and seed industry; Role and goal of seed production technology in agriculture; Basics of seed production technology: Physiology of seeds, Seed production and processing, Hybrid seed production; How to achieve desired quality of seeds?: What is quality of seeds?, Seed storage and deterioration, Seed health technology; Seed testing: Quality evaluation of seeds, Seed quality tests; Strategies to enhance seed production, productivity and quality: Emerging trends and techniques in seed production and quality enhancement.

Practical Issues related to seed industry in Sri Lanka; how to address issues related to seed industry in Sri Lanka: assignment; Microscopic study on seed development; Hybrid seed production; Effect of biotic factors on seed deterioration; Effect of abiotic factors on seed deterioration; Seed quality tests.

EA 32252 (2:15/30) GIS and Remote Sensing in Agriculture

Theory Computer systems and software's for GIS and use GIS as a tool in Agricultural decision making: Introduction to GIS, Spatial data for GIS, GIS models, GIS maps, Data for GIS, GIS components, GIS data analyzing; Fundamentals of remote sensing: Analyze hydrological data; Principles of image analysis: Image analyzing; Image analysis and their applications in agriculture: Monitoring environment changes.

Practical Introduction to GIS software; introduction to Arc vies; introduction to Arc GIS; familiarization with ERDAS; geo metric correction and geo-referencing, spectral analysis; image analysis and vegetation index, crop and soil anomalies, integration of GIS and remote sensing.

EA 41123 (3:15/60) Landscape Horticulture and Architecture

Theory What is landscaping, principles of landscaping: Introduction, Main goals of Landscaping, Historical background of Landscaping, Elements of Landscape

Design, Landscape Design Principles, Garden Illusions/ How to make small garden look bigger; Landscaping items and their establishments in a garden according to the landscaping principles: Landscaping items, Plants, Lawn, Hedges/ Borders, Trees, Hard Landscaping items; Types of landscape Gardens: Types of Landscape gardens, Rock Gardens, Japanese gardens, Roof top gardens, Urban parks; Landscape Architecture/Landscape designing: Introduction to landscape designing, Steps in Landscape designing.

Practical Identification of the plant species used in landscaping; Plant identifications; Lawn establishment, nursery for hedges, hedge establishments, tree establishment; Identification of special features of different types of gardens; Design

EA 41132 (2:15/30) Commercial Floriculture II

Theory SWOT analysis for the export oriented floriculture industry in Sri Lanka: World trade and the Sri Lankan status in the cutflower and foliage industry, SWOT analysis of the floriculture industry in Sri Lanka; National and global technological advances and proposals to resolve the problems in the industry in order to meet the requirements of local and foreign markets: National and global advances in floriculture, Different forms of floricultural items exported, Potential improvements for the existing forms of items and new innovative products, Other strategies to widen the product range, improve quality and quantity, attract buyers/ investors; Identification of major cutflower and foliage species, their export standards and their environmental requirements: Major cutflower species/ varieties - Roses, Anthuriums, Orchids, Gerbera, Carnation, fillers, Major foliage species/ varieties- Dracaena, Palms, Cordyline, Aglaonema, Dieffenbachia, codiaeum etc; Propagation, establishment and crop management practices of major cutflower and foliage crops: Major cutflower species/ varieties - Roses, Anthuriums, Orchids, Gerbera, Carnation, fillers, Major foliage species/varieties- Dracaena, Palms, Cordyline, Aglaonema, Dieffenbachia, codiaeum etc; Manage the quality and vase life of harvested cutflowers and foliages: Harvesting techniques, Postharvest management; Policies and supportive services in relation to floriculture industry: Supportive services of export oriented floricultural industry, Export procedures of floricultural items.

Practical Awareness on facilities and resources related to floriculture available at the Faculty; Potential improvements for the existing forms of items and new innovative products - Discussion; Other strategies to widen the product range, improve quality and quantity, attract buyers/ investors - Discussion and assignment, Major cutflower species/varieties - Roses, Anthuriums, Orchids, Gerbera, Carnation, fillers, Major foliage species/ varieties- Dracaena, Palms, Cordyline, Aglaonema, Dieffenbachia, codiaeum etc; Major cutflower species/ varieties - Roses, Anthuriums, Orchids, Gerbera, Carnation, fillers; Major foliage species/ varieties- Dracaena, Palms, Cordyline, Aglaonema, Dieffenbachia, codiaeum etc; Harvesting techniques & Postharvest handling.

EA 41142 (2:15/30) Urban Horticulture

Theory Issues of rapid urbanization: Phenomenon of urban horticulture, Urbanization; decreasing rural agricultural land area; How urban agriculture can address these issues: How resource systems function in urban environments, Role of urban horticulture in sustainable food systems; Potentials and limitations of urban horticulture: Feasibility of urban horticulture, Limitations of urban horticulture; Appropriate packages of urban horticulture systems: Fundamental agro-ecological principles related to urban horticulture, Specific ways that urban horticulture can be applied with examples, Needs of urban community and formulation of a project proposal to fulfil needs.

Practical Group discussion on impact of rapid urbanization of different regions of the country; Group presentation on impact of rapid urbanization of different regions of the country; How to integrate resource systems for optimum efficiency and effectiveness; How to integrate resource systems for optimum efficiency and effectiveness; Field trip and SWOT analysis for a given situation; Plan, design and formulate a proposal to fulfil the needs expressed by a specific community.

EA 41201 (1:00/100*) Research Project I

Identify a research area, define research problem; Reviewing literature and establish research framework; Define research objectives & research questions; Identify the research methodology; Proposal writing; Proposal presentation and submission of final draft.

EA 41042 (2:15/30) Stress Physiology

Theory Introduction to stress physiology: Introduction to plant growth and development under stress environment, Ecological concepts; Cell - environment interaction: Cell membrane and environment, Cell signalling and protein synthesis; Stress, regulations and adaptations: Water limited stress, Heat and cold, Pollutant and radiation stress, Biotic stress, Nutrient limited environment.

Practical Identification of plant responses under stress environment.

EA 41052 (2:15/30) Conservation and Improvement of Genetic Resources

Theory Theoretical and historical aspects of genetic resources, canter of origin of crops and their evolution: Introduction, Centre of origin and evolution of crops, Wild relatives of crops, Brief history of genetic resource conservation, Practical assignment; Natural and human processes creating and eroding biodiversity and genetic resources, domestication regions of major agricultural and horticultural crops: Loss of plant diversity, Genetic resources, Select important crops and their situation in genetic diversity, Molecular approach for Genetic resources conservation; Conserve and manage genetic resources, make ethic considerations related to conservation and use of biodiversity and genetic resources, evaluate genetic resources for future need: Objectives for conservation of animal/plant biodiversity, Techniques for

* *Notional Hours*

conservation of genetic resources, Conservation strategies, Database Management for Gene banks, Global aspects of genetic diversity.

Practical Situation of genetic diversity of selected crops; Molecular methods for genetic diversity; seed germination, tissue culture, cryopreservation.

EA 41062 (2:15/30) Hybrid Seed Production

Theory Introduction: Introduction to hybrid seeds, Trends and present status of hybrid seed production, Mechanism for cross pollination, Mechanism for self-pollination, Requisites of hybrid seed production, Characteristics of parental lines, Hybrid seeds; Maize hybrid seed production: Introduction to maize hybrid seeds, Maize Flowers Structure, Factors determine the success and quality of hybrid seed production, Seed production, Seed production Practical: Maize breeding; Rice hybrid seed production: Introduction to rice hybrid seed production, Rice Flowers Structure, seed and grain, Hybrid rice parental lines, Synchronization of flowering, Selection of CMS multiplication and hybrid seed production fields, Panicle initiation and flowering date, Other management practices, seed production; Hybrid seed production in vegetable: Introduction to hybrid seed production in Vegetable, Variation in flower structure of vegetables, Sex Expression, Pollination and Hybridization Techniques, Seed production; Introduction to hybrid flower seed production: Introduction to hybrid flower seed production, Variation in flower structure of different flowers, pollination and Hybridization Techniques, seed production

Practical Maize; Breeding; mother plant establishment, pollination, seed production; mother plant establishment, pollination, seed production

EA 41112 (2:15/30) Climate Change, Agriculture and Food Security

Theory Explain climate change, agriculture & global food security: Overview of Climate change, agriculture and global food security; Evaluate the policy and scenarios for climate change adaptation and mitigation; Policy scenarios for climate change: Analyse the techniques and models in science communications of climate change and food security ; Science communications of climate change and food security

EA 41153 (3:30/30) Post-Harvest Physiology and Technology of Horticultural Produce

Theory Importance of postharvest management of horticultural produce: Present status of postharvest losses of horticultural commodities in Sri Lanka vs. World and countries in the Asian region, Postharvest management of horticultural produce to assure food security and food safety, Reasons for high postharvest losses in Sri Lanka; National and international quality standards of horticultural produce: Setting standards for horticultural produce; Factors affecting quality and life of harvested horticultural produce and their relationships with physiology of the produce: Common market chains of horticultural produce, Channels of food losses, Structure and composition of fruits, vegetables and floricultural items in

relation to their post-harvest life, Postharvest biochemistry and physiology of horticultural produce, Major causes of postharvest losses; How to achieve desired quality standards in pre-harvest, harvesting and post-harvest stages of the crops?: Pre-harvest, harvesting, postharvest management to assure postharvest quality and extended postharvest life, Postharvest commodity treatments; Selected techniques in maturity indexing, harvesting, artificial fruit ripening, packaging and quality evaluation and suggestions to improve such techniques: Maturity indices, Harvesting techniques, Artificial ripening techniques of fruits, Packaging techniques, Quality evaluation of harvested produce; Value addition and market presentation techniques of horticultural commodities to cater the changing consumer demand: 'Minimal processing'/ 'fresh-cuts' of horticultural produce, Market presentation of horticultural produce, Latest advances in value addition and market presentation of horticultural commodities.

Practical Group discussion-Importance of postharvest management of horticultural produce; Group discussion- Quality standards of fresh produce; Assessment of causes of postharvest losses at the village fair; Market survey- Postharvest losses of a given commodity; Post-harvest diseases and disorders of horticultural products; Commodity treatments; Maturity indexing; Harvesting techniques; Commodity treatments- Ripening; Evaluation, improvement and designing of some selected harvesting tools and packaging materials; Value addition and improvement of market presentation of some selected commodities.

EA 41162 (2:15/30) Sustainable Farming Systems

Theory Introduction to the history of agriculture: definition of terms; Ethics and fundamental principles of sustainable farming systems and its relationship to sustainable food, fiber, and seed production; Sustainable farming – an alternative to intensive farming: Examine the Biological, Economic and Ethical Dimensions of Designing Small-scale Farms or Market-based Eco-agriculture Garden Systems, Agricultural Civilizations, Farming Systems; Concepts: Eco-agriculture Garden Design and Management, Seed Selection and Seedling Production.

Practical Traditional farming (chena); farm practice.

EA 41172 (2:15/30) Designing of Irrigation Systems in Commercial Agriculture

Theory Soil water conservation strategies: Management strategies to conserve soil water status in low productive soil profiles and rainwater harvesting, Soil moisture measurements and moisture characteristic curve; Design suitable irrigation systems: Preliminary requirements to design a suitable drip irrigation system, Site evaluation, Crop water requirements, Environmental factors affecting the design, Wetting pattern and number of drippers, Actual and potential evapotranspiration, Effective root zone for water uptake; Irrigation efficiencies: Methods of irrigation and irrigation efficiencies, Gross and net irrigation at readily available water fraction, Irrigation interval and frequencies for different soils; Maintenance of Irrigation System: Maintenance of Micro Irrigation System, Design a suitable irrigation system for sustainable crop production.

Practical Evaluation of soil moisture conservation practices; use of soil moisture instruments, Designing a suitable drip irrigation system for gravelly soil, Comparison studies of irrigation efficiencies of different methods, Observation of major problems of micro-irrigation systems, Suggesting appropriate solutions for trouble shootings

EA 41182 (2:15/30) Export Promotion of Agricultural Produce

Theory Export potential of Sri Lankan agricultural products and other potential products for new introductions: Present status of local, regional and global agricultural product trade, Major markets and niche markets for various agricultural products, Potential for expansion of Sri Lankan agricultural exports; International quality standards of agricultural produce: General quality standards for different products, Quality standards for important specific markets, Basic elements of the export business of agricultural produce, Basic elements of the export business of agricultural produce; Issues and challenges in exporting agricultural produce to different markets, Issues and challenges, Strategies to overcome them; Action plan for the export promotion of agricultural products: Action plan for the export promotion of agricultural products.

Practical SWOT analysis for Sri Lankan agricultural exports; Visiting and evaluation of an export oriented agriculture company based on these elements; Formulation of an action plan for the export promotion of an identified agricultural produce.

EA 41193 (3:30/30) Alternative Commercial Enterprises

Theory Apiculture and different casts in honeybee population: Introduction to apiculture and honey bees, Different cast of bees in the colony, Division of labour and functional specialization, Different communication methods of bees; Handling practices of honey bee population for honey production: Bee comb hive and its management, other beekeeping appliances, Bee colony management; Cultivate mushroom in a commercial manner: Introduction to mushroom cultivation, Mushroom, Requirements for mushroom cultivation, Mushroom seeds preparation, Mushroom cultivation; Advice to develop a commercial nursery for horticultural crops: Introduction to commercial nursery, Commercial Nursery, selection of planting materials, Management of Nursery.

Practical Identifications of bees, different cast, collect natural bee colonies; Maintain bee colony, handling of bee colony, honey extraction, experiments; Mushroom cultivation; Mushroom media preparation, inoculation of mushroom seeds, harvesting.

EA 42012 (2:00/200*) Industrial Training

Training in particular industry under the supervision of external and internal supervisors.

* *Notional Hours*

EA 42025 (5:00/500*) Research Project II

Proposed methodology establishment, treatment application, data collection and analysis, write up thesis findings; Presentation of research findings and finalizing the thesis.

* *Notional Hours*

6. DEPARTMENT OF EXPORT AGRICULTURE

6.3 Specialization Module: Crop Improvement & Plant Protection

Courses of Specialization Programme Offered by the Module: Crop Improvement & Plant Protection

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year III Semester I	EA 31012	Weed Biology and Management	(2:15/30)	Compulsory
	EA 31023	Insect Pests of Crops and Management	(3:30/60)	
	EA 31032	Agrochemicals in Crop Protection	(2:15/30)	
	EA 31042	Virology	(2:15/30)	
	EA 31052	Clinical Plant Pathology	(2:15/30)	
	EA 31062	Plant Growth Regulators	(2:15/30)	
	EA 31072	Molecular Genetics	(2:15/30)	
	EA 31082	Insect Physiology and Behaviour	(2:15/30)	
Year III Semester II	EA 32012	Research Methodology and Seminar	(2:30/00)	Compulsory
	EA 32023	Diseases of Crops and Management	(3:30/60)	
	EA 32032	Plant Cell and Tissue Engineering	(2:15/30)	
	EA 32042	Plant Breeding in Crop Improvement	(2:30/00)	
	EA 32052	Population and Quantitative Genetics	(2:20/10)	
	EA 32062	Cytogenetics	(2:15/30)	
	EA 32072	Postharvest Pests and Diseases Management	(2:15/30)	Elective
	EA 32082	Seed Production Technology	(2:15/30)	
	EA 32093	Controlled Environment Agriculture	(3:30/30)	

Courses of Specialization Programme Offered by the Module: Crop Improvement & Plant Protection (Cont.)

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year IV Semester I	EA 41013	Insect Ecology and Integrated Pest Management	(3:30/60)	Compulsory
	EA 41022	Phytochemistry in Horticultural Crops	(2:15/30)	
	EA 41032	Applied Biotechnology	(2:15/30)	
	EA 41201	Research Project I	(1:00/100*)	
	EA 41042	Stress Physiology	(2:15/30)	Elective
	EA 41052	Conservation and Improvement of Genetic Resources	(2:15/30)	
	EA 41062	Hybrid Seed Production	(2:15/30)	
	EA 41112	Climate Change, Agriculture and Food Security	(2:15/30)	
	EA 41153	Postharvest Physiology and Technology of Horticultural Produce	(3:30/30)	
	EA 41162	Sustainable Farming Systems	(2:15/30)	
	EA 41172	Designing of Irrigation Systems in Commercial Agriculture	(2:15/30)	
	EA 41182	Export Promotion of Agricultural Produce	(2:15/30)	
	EA 41193	Alternative Commercial Enterprises	(3:30/30)	
Year IV Semester II	EA 42012	Industrial Training	(2:00/200*)	Compulsory
	EA 42025	Research Project II	(5:00/500*)	

* *Notional Hours*

Course Capsules of Courses of Module: Crop Improvement & Plant Protection Offered by the Department of Export Agriculture

EA 31012 (2:15/30) Weed Biology and Management

Theory Origin and impact of weeds on crop cultivation: Introduction to weeds, biodiversity of weeds; Classification, identification and propagation of weeds: Weed biology, Life cycles and reproductive biology of weeds; Crop-weed interactions: Weed ecology; Weed control measures: Principles of weed management; Herbicides and their fate in plants and environment: Herbicides in weed control, Classification of herbicides; Principles of integrated weed management (IWM): Integrated weed management.

Practical Identification of different types of weeds; Identification of different weed propagation methods; Classification of weeds according to their biological structures; Identification of weed dispersal methods; Designing a suitable weed management programme for a given crop; Identification and classification of herbicides.

EA 31023 (3:30/60) Insect Pests of Crops and Management

Theory Bionomics of agricultural pests: introduction, bionomics of insect pest of agricultural crops; Insect pests of agricultural crops: Common Pests of agricultural crops, insect pests of plantation crops, insect pests of export agricultural crops, insect pests of field crops, insect pests of vegetable crops, insect pests of greenhouse crops (protected crop), insect pests of fruit crops, insect pests of stored products, insects pests of floricultural crops; Control methods of insect pests of crops: application of pest control strategies for control agricultural crops based on principles of pest management, legislative methods, physical methods, cultural methods, crop plant resistance to pest attack, biological control, chemical control, integrated control

Practical Identification of pests of agricultural crops

EA 31032 (2:15/30) Agrochemicals in Crop Protection

Theory Application method of chemical for disease management; Classification of fungicides; Mode of action of chemicals used to control plant diseases: Mechanisms of action of chemicals used to control plant diseases; Chemical control of weeds; Importance and ideal properties of insecticide: classification of insecticides; Insecticide Formulations and Application techniques; Phytotoxic effects of pesticides - advantages and limitations of chemical control – safe use of pesticides: Phytotoxic effects of pesticides.

Practical Application method of chemical for disease management; Preparation of fungicides; bioassay of fungicides; Different groups of weedicides; Different groups of weedicides; toxicity measures.

EA 31042 (2:15/30) Virology

Theory Concept of a virus species, and understand the criteria used to place virus species in families and genera: Concept of a virus species; How viruses are identified to genus and species and the basics of how viruses replicate and spread throughout a plant: Classification and Taxonomy of Plant Viruses; Basic commercial techniques such as ELISA and lateral flow assays for the identification of plant viruses: ELISA and lateral flow assays for the identification of plant viruses; Identify diseases caused by virus and viroids: Virus diseases; Plant virus management programs: Virus disease Management.

Practical Preservation of Virus, Identification of plant viruses using biological indicators; Identification of plant viruses; Virus disease symptoms; Identification of diseases.

EA 31052 (2:15/30) Clinical Plant Pathology

Theory Significance of clinical plant pathology: Economic significance of clinical Plant pathology; Different techniques for sterilization of laboratory items: Techniques for sterilization of laboratory items; Isolating plant pathogen: Culturing techniques of microorganisms; Culturing techniques of microorganisms: Techniques for isolating plant pathogen; Different storage techniques for long term storage of microorganisms: Techniques for long term storage of microorganisms prerequisites of storage of fungi and bacterial culture; Identify plant pathogen by using different methods: Identification methods of plant pathogen; Different techniques for inoculation of plant pathogens: Techniques for inoculation of pathogen; Different type of microscope: Microscopic techniques; Diagnostic procedures and techniques: Techniques for plant disease diagnosis.

Practical Techniques for sterilization of laboratory items; Preparation of culture media; Isolation of fungal, bacterial, nematodes; long term storage of microorganisms; Identification of fungi,bacteria, nematodes and viruses; Use and care of different types of microscope; Molecular diagnosis of plant pathogen.

EA 31062 (2:15/30) Plant Growth Regulators

Theory Introduction to plant growth regulator: Introduction, How do Plant Hormones Work?, Phytohormones and plants' responses; Types of plant growth regulators and their impact: Auxins, Cytokinins, Gibberellins, Abscisic Acid, Ethylene, Functions of plant growth regulators, Application of plant growth regulators; Commercial use of plant growth regulators, physiological effects and their functioning plants and plant products: Functions of plant growth regulators, Application of plant growth regulators; Plant growth retardants: Introduction to plant growth retardants, Plant growth retardants used in Greenhouses, PGR Efficacy.

EA 31072 (2:15/30) Molecular Genetics

Theory Introduction to molecular genetics: Introduction to Molecular genetics, Nucleic acids and proteins; Gene structure, transcription, translation and regulation of gene expression: Gene structure, transcription and translation by the three RNA

polymerases, The structure and roles of RNAs and Proteins, Regulation of transcription and translation, Genetic codes for proteins and the various response elements controlling transcription, Inducing factors, Gene silencing; DNA Damage, repair and recombination: Photo reactivation; Transposons, retro transposons, and retroviruses: Non-Mendelian genetics encompassed in somatically mobile DNA; Social issues in molecular genetics.

Practical Introduction to lab materials; use of PCR machine; molecular detection of DNA damage**;** Gene sequencing

EA 31082 (2:15/30) Insect Physiology and Behaviour

Theory Physiological aspects of insect behaviours: Insect physiology, Growth and development; Different types of sensory inputs of insects and control mechanisms: The Senses, Machanoreceptors, Chemoreceptors, Photoreceptors; Adaptive significance of insect: The nature of insect behaviour, Innate behavior, the nature of insect behaviour, Learned behavior, The nature of insect behaviour, Periodic behavior. Communication methods used by insects in their behaviours: Insect communication, Insects having colony behaviours, Social insects- Termite, Social insects – bees, ants and wasp Insect behaviours important for pest management: Insect behaviours

Practical Dissecting a cockroach to identify different body systems including insect digestive system and its parts, insect respiratory system, insect circulatory system, insect excretory system, insect nervous system and its main parts; Presentation and report on field assessment of selected behaviour of social insects, review and presentation on a behavioural subject of insects, Identification of olfactory cues of insect,Identification of members of honey bee, ant colony and termite colony

EA 32012 (2:30/00) Research Methodology and Seminar

Theory Introduction: Specific characteristics of research, Objectives of research, Classification of research, Kinds of research, Research methods and research methodology; Scientific writing: introduction to scientific writing, Thesis, Standard scientific research paper components; Proposal formulation: Introduction to what is proposal, uses of proposal, How to make research proposal, Content of a research proposal; How to conduct research: How to conduct research effectively, Problems faced during research, How to do effective research presentation in seminars.

EA 32023 (3:30/60) Diseases of Crops and Management

Theory Diseases offield crops, vegetable crops, fruit crops, plantation crops,diversified crops, ornamental plants and rice: Diseases of other important crops.

Practical Laboratory and field practical on identification of diseases: diseases symptoms of common field crop diseases, identification of diseases of field crops, diseases symptoms of common vegetable crop diseases, identification of diseases of vegetable crops, diseases symptoms of fruit crop diseases, identification of diseases

of fruit crops, diseases symptoms of plantation crop diseases, identification of diseases of plantation crops, diseases symptoms of diversified crop diseases, identification of diseases of diversified crop, diseases symptoms of ornamentals plant, identification of diseases of ornamentals plant, diseases symptoms of rice, identification of diseases of rice.

EA 32032 (2:15/30) Plant Cell and Tissue Engineering

Theory Introduction to plant tissue culture: History of plant tissue culture and its development with time, concepts and principles of plant tissue culture, totipotency, plant culture vs plant tissue culture, Tissue culture laboratory and equipment, Clonal propagation system; Planttissue culture techniques: Plant tissue culture techniques and their application in plant biotechnology, Types and purpose of culture; Crop improvement techniques: Production of new cultivars, Stages of micropropagation; Secondary metabolites: Introduction to secondary metabolites, Production of secondary metabolites; Cryopreservation: Cryopreservation for germplasm conservation, Plant cryopreservation protocols

Practical Demonstrations on equipment in the tissue culture laboratory; orchid seed culture, callus culture, regeneration techniques, anther culture with monocots and dicots, Isolation of proptoplasts and protoplast fusion, suspension culture from calli of rice.

EA 32042 (2:30/00) Plant Breeding in Crop Improvement

Theory Introduction to plant breeding in crop improvement: Importance of plant breeding in plant improvement, Plant breeding process, Molecular markers and their role in plant breeding; Genetic variability in crop improvement: Heterosis, Creating genetic variability in crop plants, Manipulation of genetic variability; Plant breeding methods: Breeding methods in self-pollinated crop plants, Breeding methods in cross-pollinated crop plants, Breeding methods in vegetatively propagated crops, Development of hybrid cultivars, Breeding for pest resistance.

EA 32052 (2:20/10) Population and Quantitative Genetics

Theory Introduction: Fundamentals, origin of population genetics, Hardy-Weinberg principle, Theory: Population-Genetics, Two-Locus Models and Linkage; Quantitative genetics: Introduction, basic principles, Quantitative genetics; Quantitative trait locus: What is quantitative traits, QTL mapping.

Practical Different aspects of calculation of quantitative genetics.

EA 32062 (2:15/30) Cytogenetics

Theory Cell structure and organelles related to genetics: Introduction to cytogenetics, Introduction to cell structure, Cell organization, Bacterial cells; Different phases of cell division: Cell division, cell cycle, types of cell division; Chromosome and its differences in different plants Chromosomes: Chromosomes, structure of Eukaryotic Chromosomes, Special types of chromosome, Change in chromosome

structure; Describe ploidy levels in organisms: Variation in chromosome number, cytological behavior, Evolution of different polyploidy species.

Practical Study of prokaryotic, eukaryotic cells; different stage of cell division; Chromosome structures; Ploidy levels.

EA 32072 (2:15/30) Postharvest Pests and Diseases Management

Theory Mechanisms behind the major biotic constraints for post-harvest losses: Major biotic constraints for post-harvest losses; Identify and manage Post-Harvest diseases: Common post-harvest Diseases; Identification of different insect pests of stored products: Major insect pests of stored products; Ecologically and environmentally sustainable methods of control of post-harvest pests and diseases management: Management of Post- Harvest Pests and diseases.

Practical Biotic constraints for post-harvest losses; common post -harvest diseases of fruits common post -harvest diseases of vegetables; major groups of post-harvest pests cereals, pulses and oilseeds; major groups of post-harvest pests of vegetables, fruits. root & tubers crops and pulses.

EA 32082 (2:15/30) Seed Production Technology

Theory Seed sector, Seed Act and seed industry; Role and goal of seed production technology in agriculture; Basics of seed production technology: Physiology of seeds, Seed production and processing, Hybrid seed production; How to achieve desired quality of seeds?: What is quality of seeds?, Seed storage and deterioration, Seed health technology; Seed testing: Quality evaluation of seeds, Seed quality tests; Strategies to enhance seed production, productivity and quality: Emerging trends and techniques in seed production and quality enhancement.

Practical Group discussion on issues related to seed industry in Sri Lanka; Group presentation on issues related to seed industry in Sri Lanka; Address issues related to seed industry in Sri Lanka; Microscopic study on seed development; Hybrid seed production; Effect of biotic factors on seed deterioration; Effect of abiotic factors on seed deterioration; Seed quality tests.

EA 32093 (3:30/30) Controlled Environment Agriculture

Theory Potential and drawbacks in the controlled environment agriculture in national and global context: Introduction to protected agriculture, Present status of national and global protected agriculture; Structural and environmental conditions in controlled environment agriculture and different cultivation techniques: Greenhouse construction, Controlling of climatic conditions, Soilless culture system; Horticultural crop management under controlled environment agriculture and cost benefits analysis of an enterprise: management of crops under protected agriculture systems, nutrient solutions for soilless culture, post-harvest handling of high value crops, cost benefit analysis and preparation of a budget for greenhouse venture.

Practical Identification of construction materials for a protected house; nursery management of high value crops; preparation of nutrient solutions; cultivation and management of plants under greenhouse conditions; analyze the cost / benefit of an enterprise.

EA 41013 (3:30/60) Insect Ecology and Integrated Pest Management

Theory Trophic relations of insects and ecological significance feeding habits of insects: Trophic relations; Physiological adaptations to allow the survival of unaffordable climatic conditions: Protective strategies; Population dynamics relation to primary and secondary ecological niche: Population dynamics, Population regulation; Basic principles of population growth: Population growth; Concepts and practices relation to integrated pest management: Integrated pest management, Biological pest management, cultural pest management, chemical pest management.

Practical Reading and writing scientific literature; Identification of different trophic levels of insects in a given niche; Influence of temperature on insect development and measuring microclimate variables important in insect ecology; Rearing of insects; Formulation of insect diet and feeding of insects; Identification of insect handling tools and handling of insects; Life tables analysis / Population dynamics (computer based), Sampling methods, Marking techniques; Development of site specific integrated pest management package.

EA 41022 (2:15/30) Phytochemistry in Horticultural Crops

Theory Major groups of phytochemicals (secondary metabolites) and their chemical, physical and biological properties: Introduction to phytochemicals, Phytochemicals in horticultural crops; Roles of phytochemicals in plants for making ecological interactions and describe horticultural methods to manipulate phytochemical levels in plants: Biosynthesis, ecological interaction, manipulation of phytochemicals; Benefits of phytochemicals for humans: industrial uses and impact on human health and measure selected phytochemicals present in fruits and vegetables:Industrial application of phytochemicals, Functional food and nutraceuticals in human health, Impact on human health and measure selected phytochemicals present in fruits and vegetables.

Practical Sample collection, preparation and polyphenol extraction methods; Antioxidant activity, total phenol and flavonoid contents; evaluate composition of polyphenols in selected fruits and vegetables hplc or gc/ms, determine vitamin C content, mini project to test biological effect of polyphenol extracts against diseases.

EA 41032 (2:15/30) Applied Biotechnology

Theory Introduction to applied biotechnology: Introduction to biotechnology, Biochemistry of macro molecules, Protein synthesis and DNA replication and recombination; DNA Technology: Requisites of DNA technology, Gene expression, plant genetic engineering; Application of DNA technology and production: Application of DNA technology, Industrial application and production, Application in agriculture; Genetically modified organisms: Genetically Modified Organisms, Bioinformatics.

EA 41201 (1:00/100*) Research Project I

Identify a research area, define research problem; Reviewing literature and establish research framework; Define research objectives & research questions; Identify the research methodology; Proposal writing; Proposal presentation and submission of final draft.

EA 41042 (2:15/30) Stress Physiology

Theory Introduction to stress physiology: Introduction to plant growth and development under stress environment, Ecological concepts; Cell - environment interaction: Cell membrane and environment, Cell signalling and protein synthesis; Stress, regulations and adaptations: Water limited stress, Heat and cold, Pollutant and radiation stress, Biotic stress, Nutrient limited environment.

Practical Identification of plant responses under stress environment.

EA 41052 (2:15/30) Conservation and Improvement of Genetic Resources

Theory Theoretical and historical aspects of genetic resources, canter of origin of crops and their evolution: Introduction, Centre of origin and evolution of crops, Wild relatives of crops, Brief history of genetic resource conservation, Practical assignment; Natural and human processes creating and eroding biodiversity and genetic resources, domestication regions of major agricultural and horticultural crops: Loss of plant diversity, Genetic resources, Select important crops and their situation in genetic diversity, Molecular approach for Genetic resources conservation; Conserve and manage genetic resources, make ethic considerations related to conservation and use of biodiversity and genetic resources, evaluate genetic resources for future need: Objectives for conservation of animal/plant biodiversity, Techniques for conservation of genetic resources, Conservation strategies, Database Management for Gene banks, Global aspects of genetic diversity.

Practical Situation of genetic diversity of selected crops; Molecular methods for genetic diversity; seed germination, tissue culture, cryopreservation.

EA 41062 (2:15/30) Hybrid Seed Production

Theory Introduction to hybrid seeds, Trends and present status of hybrid seed production, Mechanism for cross pollination, Mechanism for self-pollination, Requisites of hybrid seed production, Characteristics of parental lines, Hybrid seeds; Maize hybrid seed production: Introduction to maize hybrid seeds, Maize Flowers Structure, Factors determine the success and quality of hybrid seed production, Seed production, Seed production Practical: Maize breeding; Rice hybrid seed production: Introduction to rice hybrid seed production, Rice Flowers Structure, seed and grain, Hybrid rice parental lines, Synchronization of flowering, Selection of CMS multiplication and hybrid seed production fields, Panicle initiation and flowering date, Other management practices, seed production; Hybrid seed

* *Notional Hours*

production in vegetable: Introduction to hybrid seed production in Vegetable, Variation in flower structure of vegetables, Sex Expression, Pollination and Hybridization Techniques, Seed production; Introduction to hybrid flower seed production: Introduction to hybrid flower seed production, Variation in flower structure of different flowers, pollination and Hybridization Techniques, seed production

Practical Maize, Breeding; mother plant establishment, pollination, seed production; mother plant establishment, pollination, seed production

EA 41112 (2:15/30) Climate Change, Agriculture and Food Security

Theory Explain climate change, agriculture & global food security: Overview of Climate change, agriculture and global food security; Evaluate the policy and scenarios for climate change adaptation and mitigation; Policy scenarios for climate change: Analyse the techniques and models in science communications of climate change and food security ; Science communications of climate change and food security

EA 41153 (3:30/30) Postharvest Physiology and Technology of Horticultural Produce

Theory Importance of postharvest management of horticultural produce: Present status of postharvest losses of horticultural commodities in Sri Lanka vs. World and countries in the Asian region, Postharvest management of horticultural produce to assure food security and food safety, Reasons for high postharvest losses in Sri Lanka; National and international quality standards of horticultural produce: Setting standards for horticultural produce; Factors affecting quality and life of harvested horticultural produce and their relationships with physiology of the produce: Common market chains of horticultural produce, Channels of food losses, Structure and composition of fruits, vegetables and floricultural items in relation to their post-harvest life, Postharvest biochemistry and physiology of horticultural produce, Major causes of postharvest losses; How to achieve desired quality standards in pre-harvest, harvesting and post-harvest stages of the crops?: Pre-harvest, harvesting, postharvest management to assure postharvest quality and extended postharvest life, Postharvest commodity treatments; Selected techniques in maturity indexing, harvesting, artificial fruit ripening, packaging and quality evaluation and suggestions to improve such techniques: Maturity indices, Harvesting techniques, Artificial ripening techniques of fruits, Packaging techniques, Quality evaluation of harvested produce; Value addition and market presentation techniques of horticultural commodities to cater the changing consumer demand: 'Minimal processing'/ 'fresh-cuts' of horticultural produce, Market presentation of horticultural produce, Latest advances in value addition and market presentation of horticultural commodities.

Practical Group discussion-Importance of postharvest management of horticultural produce; Group discussion- Quality standards of fresh produce; Assessment of causes of postharvest losses at the village fair; Market survey- Postharvest losses of a given commodity; Post-harvest diseases and disorders of horticultural products; Commodity treatments; Maturity indexing; Harvesting techniques; Commodity

treatments- Ripening; Evaluation, improvement and designing of some selected harvesting tools and packaging materials; Value addition and improvement of market presentation of some selected commodities.

EA 41162 (2:15/30) Sustainable Farming Systems

Theory Introduction to the history of agriculture: definition of terms; Ethics and fundamental principles of sustainable farming systems and its relationship to sustainable food, fiber, and seed production; Sustainable farming – an alternative to intensive farming: Examine the Biological, Economic and Ethical Dimensions of Designing Small-scale Farms or Market-based Eco-agriculture Garden Systems, Agricultural Civilizations, Farming Systems; Concepts: Eco-agriculture Garden Design and Management, Seed Selection and Seedling Production.

Practical Traditional farming (chena); farm practice.

EA 41172 (2:15/30) Designing of Irrigation Systems in Commercial Agriculture

Theory Soil water conservation strategies: Management strategies to conserve soil water status in low productive soil profiles and rainwater harvesting, Soil moisture measurements and moisture characteristic curve; Design suitable irrigation systems: Preliminary requirements to design a suitable drip irrigation system, Site evaluation, Crop water requirements, Environmental factors affecting the design, Wetting pattern and number of drippers, Actual and potential evapotranspiration, Effective root zone for water uptake; Irrigation efficiencies: Methods of irrigation and irrigation efficiencies, Gross and net irrigation at readily available water fraction, Irrigation interval and frequencies for different soils; Maintenance of Irrigation System: Maintenance of Micro Irrigation System, Design a suitable irrigation system for sustainable crop production.

Practical Evaluation of soil moisture conservation practices; use of soil moisture instruments, Designing a suitable drip irrigation system for gravelly soil, Comparison studies of irrigation efficiencies of different methods, Observation of major problems of micro-irrigation systems, Suggesting appropriate solutions for trouble shootings

EA 41182 (2:15/30) Export Promotion of Agricultural Produce

Theory Export potential of Sri Lankan agricultural products and other potential products for new introductions: Present status of local, regional and global agricultural product trade, Major markets and niche markets for various agricultural products, Potential for expansion of Sri Lankan agricultural exports; International quality standards of agricultural produce: General quality standards for different products, Quality standards for important specific markets, Basic elements of the export business of agricultural produce, Basic elements of the export business of agricultural produce; Issues and challenges in exporting agricultural produce to different markets, Issues and challenges, Strategies to overcome them; Action plan for the export promotion of agricultural products: Action plan for the export promotion of agricultural products.

Practical SWOT analysis for Sri Lankan agricultural exports; Visiting and evaluation of an export oriented agriculture company based on these elements; Formulation of an action plan for the export promotion of an identified agricultural produce.

EA 41193 (3:30/30) Alternative Commercial Enterprises

Theory Apiculture and different casts in honeybee population: Introduction to apiculture and honey bees, Different cast of bees in the colony, Division of labour and functional specialization, Different communication methods of bees; Handling practices of honey bee population for honey production: Bee comb hive and its management, other beekeeping appliances, Bee colony management; Cultivate mushroom in a commercial manner: Introduction to mushroom cultivation, Mushroom, Requirements for mushroom cultivation, Mushroom seeds preparation, Mushroom cultivation; Advice to develop a commercial nursery for horticultural crops: Introduction to commercial nursery, Commercial Nursery, selection of planting materials, Management of Nursery.

Practical Identifications of bees, different cast, collect natural bee colonies; Maintain bee colony, handling of bee colony, honey extraction, experiments; Mushroom cultivation; Mushroom media preparation, inoculation of mushroom seeds, harvesting.

EA 42012 (2:00/200*) Industrial Training

Training in particular industry under the supervision of external and internal supervisors.

EA 42025 (5:00/500*) Research Project II

Proposed methodology establishment, treatment application, data collection and analysis, write up thesis findings; Presentation of research findings and finalizing the thesis.

* *Notional Hours*

Department of Livestock Production

Department of Livestock Production

Department of Livestock Production

Department of Livestock Production

7. DEPARTMENT OF LIVESTOCK PRODUCTION

Core Programme Courses Offered by the Department of Livestock Production

<table>
<tr><th colspan="2">Year I</th><th colspan="2">Year II</th></tr>
<tr><th>Semester I</th><th>Semester II</th><th>Semester I</th><th>Semester II</th></tr>
<tr><td>Anatomy and Physiology of Farm Animals
LP 11013 (3: 30/30)</td><td rowspan="2">Fundamentals of Biochemistry
LP 12012 (2: 15/30)</td><td>Animal Health and Hygiene
LP 21012 (2: 15/30)</td><td>Agrostology
LP 22012 (2: 15/30)</td></tr>
<tr><td rowspan="2">Genetics
LP 11022 (2: 15/30)</td><td rowspan="2">Management of Non Ruminants
LP 21022 (2: 15/30)</td><td rowspan="2">Farm Practice
LP 22023 (3: 00/180)</td></tr>
<tr><td rowspan="2">Principles of Food Science and Technology
LP 12023 (3: 30/30)</td></tr>
<tr><td>Introduction to Aquatic Biology and Aquaculture
LP 11032 (2: 15/30)</td><td>Principles of Animal Nutrition
LP 21032 (2: 15/30)</td><td>Management of Ruminants
LP 22032 (2: 15/30)</td></tr>
</table>

Course Capsules of the Department of Livestock Production

LP 11013 (3: 30/30) Anatomy and Physiology of Farm Animals

Theory Fundamentals in anatomy, physiology & embryology; introduction to descriptive terminology, introduction to developmental biology of mammals, introduction to development of body cavities & organs, introduction to various body planes of farm animals & laboratory animals, introduction to macroscopic & microscopic anatomy, introduction to cells, tissue, organ & systems, descriptive systemic study of farm animals; the skeletal system, functions of bones terminology classification of bones according to gross appearance axial skeleton appendicular skeleton. microscopic anatomy & growth & development of bone & joints, anatomy of the muscular system types of muscle tissue, functions of the muscular system skeletal muscle organization, thoracic limb, pelvic limb & head, nervous system; structure of the nervous system & sensory organs, cardio vascular system anatomy & physiology of heart & vessels, composition of blood, digestive system; anatomy & physiology of farm animal digestive system (ruminant & monogastric animals), species variation in anatomy & physiology of digestion, reproductive system: female reproductive system, folliculogenesis, puberty & estrus cycle, pregnancy & parturition, male reproductive anatomy & physiology, spermatogenesis, morphology, maturation, storage of semen & artificial insemination, anatomy of mammary gland & physiology of lactation, introduction; importance of study of endocrinology, basic biochemical properties hormones, basic comparative endocrinology & physiology; study of parturition, milk letdown process & calcium regulation in cow as an example, current trends in farm animal physiology; discussion based on novel research findings in animal human interphase studies.

Practical Identification of the body cavities & body planes, structural arrangement of major farm animals' body, identification of body parts of cattle, goat, pigs & poultry externally, study the parts & bones of axial & appendicular skeletal system, macroscopic features of various internal organs, & macroscopic anatomy of farm animal digestive systems, macroscopic anatomy of male & female reproductive systems.

LP 11022 (2: 15/30) Genetics

Theory Cellular processes; ribonucleotides & their replication, protein synthesis, mitosis & meiosis, cell cycle, their relevance in genetic diversity, Mendelian genetics; introduction to Mendelian genetics, principles of Mendelian genetics, law of segregation & independent assortment, single locus genetics & monohybrides, double loci genetics & dihybrides, test cross, genetic variation, probability, evaluating genetic data, modifications of Mendelian genetics, population genetics; introduction, calculating allelic frequencies, Hardy – Weinberg law, forces changing HW equilibrium, heterozygocity & inbreeding, selection, chi-squire test for genetics, quantitative genetics; introduction to quantitative genetics, quantitative trait loci, genetic variability of quantitative traits & sources of it, heritability & repeatability of traits, breeding value, introduction to genetic applications; genetic basis of selection & breeding, ELISA & PCR in plant & animal husbandry, current trends in genetics.

Practical Calculations on Mendelian, population & quantitative genetics & the application of chi-squire test for genetics.

LP 11032 (2: 15/30) Introduction to Aquatic Biology and Aquaculture

Theory Importance, status, history & prospects of aquaculture & fisheries; defining fisheries & aquaculture, importance of fisheries & aquaculture in food production at national & global level, present status, history & future prospects of fisheries & aquaculture at national & global level, limitations & problems of fisheries & aquaculture development & mitigatory measures, biology of finfish; finfish diversity, classification & lifecycles, anatomy & physiology of finfish, economically important finfish species, characteristics & adaptations, biology of shellfish; shellfish diversity, classification & lifecycles, anatomy & physiology of shellfish, characteristics adaptations of shellfish, economically important shellfish species, characteristics & adaptations, fundamentals of aquatic ecology; types of aquatic bio-systems & food webs: freshwater ecology (limnology), marine ecology, types of aquaculture; fin fish & shell fish, ornamental & food fish culture, aquatic plants & seaweed culture, systems of aquaculture; extensive, semi intensive & intensive, water based & land based aquaculture, techniques in aquaculture; pond, raft, pen, cage, running water culture systems, introduction to integrated aqua-farming; concept of integrated fish farming, crop-fish integration systems, livestock-fish integration systems, crop-livestock-fish integration systems, extractive aquaculture for sustainable farming, problems & solutions for sustainable aqua-farming; existing & expected problems for sustainable fish culture & fisheries, mitigatory measures towards sustainable fish culture & fisheries.

Practical Identification, external & internal anatomy of finfish, identification, external & internal anatomy of shellfish, types of aquatic bio-systems & food webs, evaluation of fish culture techniques based on suitability & performances.

LP 12012 (2: 15/30) Fundamentals of Biochemistry

Theory Structure & properties of carbohydrates; classification, functions, reactions & structures of monosaccharide, disaccharides & polysaccharides, digestion of carbohydrates, structure & properties of proteins; structures & properties of amino acids & organizational levels of proteins structure, structure & properties of dietary lipids; structure & properties of fatty acids, tracylgylcerols, phospholipids glycolpids & cholesterol, structure & properties of vitamins & minerals; overview, biological functions of water soluble & fat soluble vitamins & minerals, carbohydrates; introduction, monosaccharide & disaccharide metabolism, glycogen metabolism, proteins; amino acid metabolism, conversion of amino acids to specialized products, fat & oils; digestion & absorption of dietary lipids, fatty acids & triacyglycerol synthesis & degradation, cholesterol metabolism, storage & expression of genetic information; DNA structure & replication, RNA structure & synthesis, protein synthesis, interaction of metabolic pathways & energy sources; metabolic effects of insulin & glucagon, metabolism in well fed state & starvation.

Practical Qualitative & quantitative test for carbohydrates, proteins, & fat & oil, basic enzyme assay practical

LP 12023 (3: 30/30) Principles of Food Science and Technology

Theory Carbohydrates; introduction, properties of sugars, starch, pectin, cellulose & carbohydrate gums, proteins; properties of amino acids & structure of protein, interaction of proteins with other food constituents & their influence on food quality, fat & oils; properties of fatty acids, triaceylglycerols & properties of fat important in food technology, principles of rancidity & its control, additional food constituents; properties of emulsifiers, organic acids, enzymes, oxidant & antioxidants, pigments. colors & flavors, minerals & vitamins, food quality factors; organoleptic properties & principles of sensory evaluation, food deterioration; physical chemical, & biological factors associated with food deterioration, principles of food processing; technology of food processing, processing concepts, unit operation, primary & secondary food processing, principles of food packaging, food preservation; principles of cold & heat preservation, dehydration & concentration, irradiation, chemical preservation, microorganism in foods; types of microorganism on food & their growth, overview of microbial food spoilage, fermentation & food borne diseases, food safety, risks & hazards; introduction to food safety, hazards & risks, food related hazards, microbiological consideration in food safety.

Practical Proximate analysis of food along with the analysis of other additional food constituents, sensory evaluation practical, browning reactions practical, use of a model food to study the food processing techniques & unit operation, determination of food preservatives, microscopic analysis of food microorganism, water quality test.

LP 21012 (2: 15/30) Animal Health and Hygiene

Theory Introduction; definition for disease, common causative agents of diseases, bacteria, virus, fungi, parasites, spirochetes, rickettsia, chlamydia. inflammation & disease process, introduction to infectious & non-infectious diseases, metabolic diseases & deficiency conditions, general clinical examination; various body parameters & their physiological values of all farm animal species will be discussed. inflammation & immunological reaction against the invading foreign substances, introduction; classification of cattle, goat, sheep, swine, rabbits, laboratory animals & poultry diseases based on bacteria, virus, fungi, parasites, spirochetes, rickettsia, chlamydia or other causative agent, diseases of cattle, goats & sheep; mastitis, foot & mouth disease, haemorrhagic septicaemia, black quarter, rinderpest, brucellosis, vector borne diseases, prion & degenerative diseases, leptospirosis, rabies, milk fever, grass tetani, ketosis, bloat & other timely important or emerging conditions, diseases of goats & sheep; cerebrospinal nematodiasis, tetanus, pneumonia, foot rot & pregnancy related conditions & other timely important or emerging conditions, diseases of poultry; marek's disease, new cartels disease, infectious bursal disease, & other important viral conditions, salmonellosis & collibacilosis & other important bacterial diseases, aspergillosis & other important fungal infections, coccidiosis & nematode infections, metabolic disorders & nutritional deficiencies & other timely important or emerging conditions, diseases of swine; swine fever, piglet anemia, mastitis metritis agalactia & other important conditions & other timely important

or emerging conditions, diseases of rabbits; parasitic conditions, coccidiosis & pneumonia & other timely important or emerging conditions, diseases of lab animals; mouse/ rat hemobartonellosis, middle ear disease, pneumonia, guinea pig paratyphoid & other timely important or emerging conditions, Introduction; definitions for zoonosis, public health, occupational health, strategies adapted for prevent or minimize zoonosis spread, common zoonotic diseases; common zoonotic conditions & clinical signs & diagnosis, health & safety; education & frequent screening & treatment methods, introduction; definitions for prevention & control methods, strategies, monitoring & record keeping; mode of application of preventive & control strategies in important diseases, farm sanitation & cleanliness, biosecurity, probiotics, prebiotics, stress control, vaccination, genetics & breeding, water, routing management practices, valuation & screening; methods to routing reporting, monitoring & assessment of strategies adapted, Introduction; definitions for disease outbreak, epidemic, endemic, pandemic, contagious, infectious & examples for each situation, national & international law; animal disease act in Sri Lanka, OIE regulations, reporting & screening authority; local & international agencies dealing with animal health regulation & disease control.

Practical Microscopic features of disease causing agents, disease macroscopic- postmortem I–large animal (depend on field availability)/ rabbit, disease macroscopic-postmortem II- poultry.

LP 21022 (2: 15/30) Management of Non Ruminants

Theory Introduction; importance of pig farming, potentials & constrains of pig farming, management of a breeding stock; breeds of pigs, selection of breeding stocks of pigs, selection criteria (traits), genetic defects, planning of breeding programs, management at mating & pregnancy, management of pigs; pre- & post-partum management, management of piglets & fatteners, identification methods of pigs, swine management for different meat products (suckling pigs, pork, bacon, meat, & lard), housing types & space requirements of pigs, diseases of pigs; common diseases & etiology, preventive measures, maintaining bio security in farms, vaccination programmes & methods, slaughtering of pigs; slaughtering procedure, production of pork bacon, meat, lard & suckling pigs, keeping records in pig farming; importance & use, different types of records, field visit; visit a large scale piggery, introduction; importance of poultry farming, potentials & constrains of poultry farming, management systems & housing for poultry; management systems of broilers & layers, brooding, housing types & space requirements of broilers, layers, management of a breeding stock; breeds of poultry, selection of breeding stocks of poultry, selection criteria (traits),genetic defects, planning of breeding programs, diseases of poultry; common diseases, preventive measures, maintaining bio security in farms, vaccination programmes & methods, slaughtering of broilers; slaughtering procedure, production of broiler chicken meat, keeping records in poultry farming; importance & use, different types of records, miscellaneous poultry production; breeds of ducks, quails & turkeys, management aspects, field visit; visit a large scale poultry farm, introduction; importance of rabbit farming, potentials & constrains of rabbit farming, management of a breeding stock; breeds of rabbits, selection of breeding stocks of rabbits, selection criteria (traits), genetic

defects, planning of breeding programs, management at mating & pregnancy, management of rabbits; pre & post-partum management, management of kids & growers, identification methods of rabbits, housing types & space requirements of rabbits, rabbit for fur & meat, diseases of rabbit; common diseases, preventive measures, maintaining bio security in farms, vaccination programmes & methods, slaughtering of rabbit; slaughtering procedure, production of rabbit meat, keeping records in rabbit farming; importance & use, different types of records, field visit; visit a large scale rabbit farm.

Practical Identification of breeds of swine, maintain a group of pigs in the faculty farm, maintain records in a piggery, identification of breeds of poultry, maintain a flock of broilers & layers in the faculty farm, maintain records in a poultry house, identification of breeds of rabbits, maintain a group of rabbits in the faculty farm, maintain records in a rabbit farm.

LP 21032 (2: 15/30) Principles of Animal Nutrition

Theory Fundamentals of animal nutrition; introduction to principles of animal nutrition, definition for nutrition, nutrients, feed, ration, concentrates & roughages, describe the basic nutrients such as water, carbohydrates, proteins, fats, vitamins & minerals, classification of animal feedstuffs; classification of animal feedstuffs-forage, concentrates, roughages, pastures, fodders, by-products etc. basic nutrients of animal feedstuffs-water, carbohydrates, proteins, lipids, vitamins & minerals, bioenergetics of feedstuffs-energy partition of animal feedstuffs, Feed additives; feed additives-definition & categories of feed additives, nutritive feed additives, non-nutritive feed additives, role & use of feed additives. unidentified growth factors, anti-nutrients; ant-nutritive factors in feed stuffs, types of anti-nutritional factors, effects of anti-nutritional factors, control or elimination of anti-nutrients, perform the analytical techniques required for feed evaluation & interpret the results of feed analysis, analytical techniques in feed evaluation; sources of animal nutrients-classification of feeds & feed ingredients, plant, animal & by-product sources, proximate composition of feed ingredients, energy, carbohydrates, proteins, lipids, vitamins & mineral contents, nutritive values of feed resources, evaluation of animal feedstuffs, physical evaluation of feedstuffs, chemical evaluation of feedstuffs. biological evaluation of feedstuffs, energy evaluation of feedstuffs, measurement of gross, digestible, metabolisable & heat energy contents of feeds, determinants of nutritive value, TDN system of feed evaluation. net energy system of feed evaluation, metabolism trials & feeding experiments, factors affecting on nutritional quality; factors affecting on nutritional quality, impact of management practices on nutritional quality, impact of herbage variation on nutritional quality, impact of soil on nutritional quality. impact of environment on nutritional quality, nutritional physiology; nutritional physiology, digestion of feeds by non-ruminant & ruminant species, absorption & utilization of nutrients by non-ruminant & ruminant species, mastication & enzyme action, bioavailability of nutrients & nutrient metabolism, role of nutrients, function of nutrients, water, carbohydrates, proteins, lipids, vitamins & minerals, deficiencies of nutrients.

Practical Identification of feeds & feed ingredients & preparation of a feed museum, practice of preservation techniques, preparation of nutritional profiles, quality assessment of animal feedstuffs-physical evaluation, detection of appearance, color, odor, flavor, texture, palatability, inert materials, chemical evaluation or proximate analysis, detection of moisture content, detection of dry matter content, detection of ash & mineral content, detection of organic matter content, detection of crude protein content, detection of crude fat content, detection of crude fiber, NDF & ADF content, detection of nitrogen free extracts content. detection of vitamins content, detection of anti-nutrients content, detection of gross energy content, biological evaluation of feedstuffs, detection of in vitro digestibility, detection of in situ digestibility, in vivo digestibility.

LP 22012 (2: 15/30) Agrostology

Theory Introduction to agrostology; what is forage? importance of green forage. factors affecting on green forage production such as climatic, plant, soil, management & animal factors, pasture & fodder production in Sri Lanka; present status of pastures & fodders production in different agro-climatic zones. potentials of pasture & fodder production, constraints/limitations for forage production, strategies/remedies for developing forage production, agronomic description of the natural & improved pasture & fodder species; morphological features, nutritive composition, climatic & environmental adaptation, establishment & management of pasture & fodder fields; selection & preparation of the lands, selection of suitable species/verities & preparation of planting materials, methods of cultivation, cultural practices & maintenance of the pasture & fodder fields, defoliation of pasture & fodder; methods of defoliation, status of defoliation, frequency & intensity of defoliation, factors affecting on defoliation, manipulation of defoliation, conservation of pasture & fodder; conservation as hay & silage & their preparations, evaluation of the quality of hay & silage, factors affecting on hay & silage quality, method of hay & silage feeding, advantages & disadvantages of hay & silage production.

Practical Preparation of pasture & fodder album collecting approximately 40 specimens & each specimen should be accompany with agronomic description such as botanical name, family name, common name, growth habit, morphological characters, preferable climate, climatic adaptations & nutritional composition, establishment & management of pasture & fodder fields, selection of a suitable location & preparation of lands, determination & adjustment of soil ph & application of manure & basal dressing, selection & preparation of suitable plant species/verities & practice of germination trails, establishment of pastures & fodders, maintenance of pasture & fodder fields, harvesting & estimation of the yield, skills & quality, practice of harvesting by manual & mechanical methods, estimation of forage yield with respect to the annual feed requirements in the form of fresh matter, dry matter, silage & hay, estimation of labor & machinery requirements for harvesting, conservation of pasture & fodder, preparation of various types of silage, preparation of various types of hay, evaluation of silage & hay qualities by visual observation & chemical analysis.

LP 22023 (3: 00/180) Farm Practice

Practical Restraining of farm animals; basic rope work, restraining techniques for cattle, restraining techniques for goat & sheep, restraining techniques for swine, restraining techniques for poultry & miscellaneous poultry, breed identification; restraining techniques for rabbits, identify different species of cattle, goat, swine, poultry & miscellaneous poultry & rabbits, body parts identification of livestock species; positional & directional terms, body regions, skeleton, major musculatures, main innervations of cattle, goat, swine, poultry & miscellaneous poultry & rabbits, design houses for livestock species that are suitable for different environmental conditions; different types of houses for cattle, goat, swine, poultry & miscellaneous poultry & rabbits, feeding of livestock species; types of feed available for feeding livestock species(cattle, goat, swine, poultry & miscellaneous poultry & rabbits), production of pasture, fodder & use of non conventional feed resources, feeding regimes for different livestock species at different production stages, formulation of rations, demonstrate the general management practices; identification of animals using identification methods such as tagging, ear notching, determination of age of farm animals, general management practices such as hoof trimming, de-budding, castration, preparing records & maintaining records in livestock farming; types of records, record keeping, cost benefit analysis, monitor & assess livestock health & welfare; regular checks to assess ill health (general examination) of livestock species, symptoms of ill health & identification of common diseases, disorders of livestock species, implement livestock health & welfare procedures; occupational health & safety hazards during the handling if livestock species, quarantine & bio security procedures that should be maintained as to minimize the risks of disease introduction. thorough personal hygiene practices to reduce the risks from diseases transmissible to humans, management of minor health issues such as wound management, de-worming, de-ticking, vaccination etc.); identifying ill health conditions, identifying generally used medicinal preparations in livestock production, identifying routes of drug administrations, vaccination & vaccination schedules for livestock species, management of minor health problems (wound management, use of anthelmintics, external parasitic control etc), maintaining health; prepare, maintain & store animal health equipment, medicines & etc, milking methods, clean milk production; methods of milking, hygienic milking for clean milk production, milk quality testing, slaughtering of livestock species; ante-mortem examination of animals, methods of slaughtering of animals, postmortem inspection, production of clean meat (consumer safe meat), maintain aquaculture systems; pond construction, fish handling & stocking, feeding, water quality management, monitoring of health & condition, harvesting, processing/ live fish transport, perform waste management in a livestock farm; systems & methods of animal waste management such as bio gas production, recycling, rendering, waste integration, byproduct processing.

LP 22032 (2: 15/30) Management of Ruminants

Theory Current status & future trends of cattle, buffaloes, sheep & goat production; production & distribution of cattle, buffalo, goat & sheep at national & global level, potentials & constraints of cattle, buffalo, sheep & goat production, breed

characters of Indian, European & local breeds; dairy breeds, meat breeds, draft breeds, dual breeds, suitable European & Indian breeds for different climatic zones in Sri Lanka, introduction to synthetic breeds & crosses; purpose of development of synthetic breeds & crosses, identification of suitable synthetic breeds & crosses for different climatic zones in Sri Lanka, rearing systems & housing; intensive (small holder/large scale), semi intensive & extensive-tethering/back yard/jungle rearing systems & production potentials, different housing systems- loose barn & conventional housing systems, housings for different climatic zones, management of neonatal animals; cleaning of animals, stimulation of respiration, removal of umbilical cord, management of colostrums feeding & its importance, passive immunity & development of active immunity in neonatal animals, management of calf, kid, lamb; natural & artificial milk feeding & advantages, concentrate feeding, weaning, housing, identification methods, castration, de budding & dehorning, removal of extra teats, management of heifers; oestrus signs, importance of attain puberty at the correct age, importance of nutrition, heat detection methods & oestrus signs, factors to be considered in first mating, natural & artificial insemination, management of pregnant animals; foetal growth pattern, importance of nutrition, isolation at the latter part of pregnancy & preparation of calving pen, parturition process & management of parturition, management of lactating animals; milk synthesis & milk secretion, lactation curve, dry matter intake & energy balance during the lactation, management of postpartum animals; postpartum problems, re-mating, management of dry animals & re-mating; importance of drying, drying methods, dry cow therapy & mastitis control, re-mating of cattle,goat, sheep & buffalo, management of stud bull, buck & ram; selection of breeding bull, buck & ram, sheds for breeding animals, mating schedule, milking methods & clean milk production; full hand method, sniffing, knuckling, pinching, machine milking, factors affect on clean milk production, draught purpose of buffalos; morphological & physiological adaptations for draught purpose, minimize heat stress, beef & mutton production; production systems of meat breeds, slaughtering, wool production in sheep; wool cutting, wool processing, wool grading, different types of records; birth records, breeding records, health records, production records.

Practical Identification of cattle breeds based on breed characters, field visit to a commercial farm, identification of instrument use for different management practices of ruminants, demonstrations on castration, disbudding, ear tagging, tattooing, demonstrate artificial insemination, demonstrate dry cow therapy & mastitis control, handling & restraining of ruminants, feeding, hoof trimming in ruminants, body scoring, wool cutting & detection of age based on teeth in sheep, hand milking, machine milking & clean milk production.

7. DEPARTMENT OF LIVESTOCK PRODUCTION

7.1 Module 01: Animal Bio-resource Technology and Management

Courses of Specialization Programme Offered by the Department of Livestock Production

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year III Semester I	LP 31012	Dairy Production	(2:15/30)	Compulsory
	LP 31023	Equine Management and Microlivestock Production	(3:30/30)	
	LP 31032	Food Microbiology	(2:15/30)	
	LP 31042	Food and Nutrition	(2:15/30)	
	LP 31053	Poultry Production	(3:30/30)	
	LP 31063	Quality Management of Food Processing and Handling	(3:30/30)	
	LP 31072	Swine Production	(2:15/30)	
Year III Semester II	LP 32022	Animal Breeding	(2:15/30)	Compulsory
	LP 32042	Applied Animal Nutrition	(2:15/30)	
	LP 32052	Aquatic Bio-resource Production	(2:15/30)	
	LP 32064	Dairy Science and Technology	(4:30/60)	
	LP 32073	Meat Science and Technology	(3:30/30)	
	LP 32012	Animal Biotechnology	(2:15/30)	Elective
	LP 32032	Applications of Aquatic Bio-resource Management	(2:15/30)	
	LP 32082	Risk Assessment and Food Safety Management in Fishery Product	(2:15/30)	
	LP 32092	Zoonoses and Public Health	(2:15/30)	

Courses of Specialization Programme Offered by the Department of Livestock Production (Cont.)

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year IV Semester I	LP 41023	Animal Reproduction and Assisted Reproductive Technologies	(3:30/30)	Compulsory
	LP 41082	Health Management of Livestock Species and Fish	(2:15/30)	
	LP 41122	Proposal Formulation and Scientific Writing	(2:30/00)	
	LP 41012	Animal Behavior and Welfare	(2:15/30)	Elective
	LP 41032	Biodiversity Management	(2:15/30)	
	LP 41042	Cereal Science and Technology	(2:15/30)	
	LP 41052	Cleaner Production	(2:15/30)	
	LP 41062	Extractive and Sustainable Aquaculture	(2:15/30)	
	LP 41093	Laboratory Techniques in Livestock Production	(3:15/60)	
	LP 41103	Ornamental Fish Culture	(3:30/30)	
	LP 41113	Processing and Utilization of Animal Byproducts	(3:30/30)	
	LP 41132	Recent Advances in Animal Bio-resource Production	(2:15/30)	
Year IV Semester II	LP 42012	Industrial Training	(2:00/200*)	Compulsory
	LP 42026	Research Project	(6:00/600*)	

* *Notional Hours*

Course Capsules of the Module 01: Animal Bio-resource Technology and Management

LP 31012 (2:15/30) Dairy Production

Theory Introduction to the dairy industry in Sri Lanka; history of the dairy industry, present status and future trends of the local and global dairy industry, introduction to the dairy industry in Sri Lanka; potential and resources available for dairy development, constraints for dairy development, strategies/ remedies for dairy development, role of dairy production in sustainable agriculture, establishment of a dairy farm; dairy farming systems, selection of a suitable location, establishment of units, selection of a foundation stock, identification of dairy cattle breeds, judging and selection of dairy cows, establishment of the dairy herd, physiology of lactation; structure of the udder, synthesis of milk constituents, milk ejection and hormonal control, location curve and composition of milk, management of dairy cattle feeding; effective feeding of new born calf, calf, heifer, lactating cow, dry cow and diseased animals, factors affecting on milk quality and quantity; milking methods and clean milk production - hand milking, machine milking and parts of milking machine and method of clean milk production, effect of management, animal and environment factors on milk quality and yield, management of dairy cattle reproduction; understanding of reproductive cycleandestrus detection, mmeasures of reproductive performances, manipulation of reproductive parameters, artificial insemination and reproductive disorders, herd administration; record keeping, basic characters of records, deferent types of records, advantages of records keeping and budgeting and costing, record analysis, evaluation of the herd and its productivity.

Practical An individual presentation on "role of ruminant production in sustainable agriculture in Sri Lanka", practice of all routine activities in intensive dairy farms - practice at the university, New Zealand, Diagama and Bopaththalawa dairy farms, evaluation and ranking these dairy farms, judging of dairy cows - New Zealand, Diagama and Bopaththalawa dairy farms, identification andhandling of dairy farm equipment, practice of feeding all types of dairy farm animals, practice of hand and machine milking methods at New Zealand, Diagama, Bopaththalawa dairy farms and MLDC, understanding of reproductive cycleandestrus detection, measures of reproductive performances, manipulation of reproductive parameters, artificial insemination and reproductive, Practice of heat synchronization, estrus detection and application of AI techniques, critical evaluation of half acre and two acre dairy farming systems at the MLDC, practice of dairy farm record analysis at the MLDC and university farm.

LP 31023 (3:30/30) Equine Management and Microlivestock Production

Theory Introduction; present trends in equine production in the world, equine breeds characters; different breeds for different productions, donkeys, establishment of a horse farm; land selection, housing and fencing, management of neonatal and young herd; removal of umbilical cord, facilitate breathing, colostrums and milk feeding, maintain comfortable environment, weaning, feeding and nutrition; feeding

and nutritional requirement for different age groups andphysiological stages, reproduction and breeding; oestrus signs and detection of best time to mate, natural and artificial mating, pregnant animal management, management of parturition, lactating animal management, re-mating, diseases and health care; grooming, hoof trimming, common disease and parasites, products and utilization; meat, milk and several other by products, Introduction to micro livestock production; definitions and concept of micro livestock, current trends, future prospects and constraints in micro livestock production, identification of breed characteristics of rabbit, quails, guinea pigs, crocodiles and deer; Indian, European and local breeds, breeds for different climatic zones, traditional and improved verities of gunia pigs, salt water and sea water crocodiles, management of rabbit, quails, gunia pigs, crocodiles and deer; management of neonatal, brooding in quails, management of young stock, different caging systems, breeding and reproduction; identification of male and female, selection of breeding stock, mating behavior, seasonal breeding in deers (rutting season), products and utilization of rabbits, quails, gunia pigs, crocodiles anddeer; rabbit, quail, crocodile and deer meat production, quail and crocodile egg production, processing of skin and other valuable products, introduction to International Union of Conservation of Nature (IUCN); IUCN category, identify micro livestock species according to IUCN categories, introduction to future potential for research and development in microlivestock.

Practical Breed and sex identification, housing and feeding management, clinical diagnosis of common diseases, slaughtering techniques.

LP 31032 (2: 15/30) Food Microbiology

Theory Habitat and taxonomy; natural habitat of microbial biota and their role, bacterial taxonomy, primary sources of microorganism in foods, growth parameters; intrinsic and extrinsic factors affect on microbial growth, meat poultry and sea food; microbial spoilage of fresh meat, poultry and sea foods, vegetables and fruit products; spoilage of fresh and frozen vegetables and fruits, fermented dairy products; fermentation, lactic acid bacteria, probiotics and prebiotics, starter cultures and fermented dairy products, Non dairy fermented food products; microbiology of fermented meat, fish, bakery and plant products, chemical and biocontol; chemical preservatives, microbial interference, bacteriocins, endolysins, naturally occurring antimicrobial systems, food microbial quality and safety; microbial indicators of product quality and safety, HACCP and FSO systems for food safety, Food borne diseases; food infection and intoxication.

Practical General practices in food microbiology laboratory and aseptic handling of microbes, study on bacterial physiology, study on essential requirements for the growth of micro organisms, preparation of bacterial growth media, methods for controlling microbial growth (sterilizations methods etc) study on bacterial growth curve and factors affecting the growth, sampling procedures and handling and dispatching samples, identifying spoilage organisms by conventional methods, enumerating the microbial load in a food sample, study on different food preservation methods, detection of chemical residues in food products, isolation and identification of different microbes from food commodities (this covers all the basic microbiological

methods in isolation and identification including, sampling, media preparation, methods of culturing organisms, enumerating techniques, staining procedures etc), confirmation of isolates by molecular tools, study on microbial quality of food items.

LP 31042 (2:15/30) Food and Nutrition

Theory Food security; introduction, factors affecting food security, challenges and contribution of modern technology in food sustainability, food safety; challenges in food safety, food borne illness, food borne outbreak, evaluation of nutritional status of a country; dietary reference value and food guide pyramid, food balance sheet and nutritional intervention programs, evaluation of nutritional status of a individual; dietary recommended values, daily energy intake and expenditure of an individual, nutritional parameters and their uses, modern food habits; regional and global pattern of food consumption, diet related non-communicable diseases and prevention of them; dietary habit and arthrosclerosis, cancers, diabetes and food allergy, prevention of non-communicable diseases by changing the life style and food habit, food consumption survey; background and information, objectives, selection criteria and methods of food consumption survey.

Practical Development of models for causal sequence of nutritional status for different comminutes, calculation of daily energy requirement, estimation of healthy body weight, survey on dietary habits of university students and development of model for causal sequence of nutritional status for different comminutes, development and application of questionnaires for food consumption survey.

LP 31053 (3:30/30) Poultry Production

Theory Introduction to poultry industry in Sri Lanka; importance of poultry industry for sustainable agriculture, historical background and present status in Sri Lanka, constraints and future prospects of poultry industry in Sri Lanka, planning a poultry farm; market identification, planning for continuous poultry production, production process for commercial layers, planning of continuous production of docs, commercial eggs and broiler meat, poultry breeding; breeds and selection of parent stocks, breeding and production commercial chicken crosses, line breeding and nest mating, sex linked characteristics and its application, incubation and hatchery management; introduction to hatchery industry, selection of hatching eggs, care and storage of hatching eggs before incubation, methods of incubation, factors affecting production of quality chicks, analysis of hatchability problems, hatchery hygiene and prevention of hatchery borne diseases, feeding and nutrition for various types of production and age groups; feeding and nutritional requirements, ration formulation, nutritional deficiencies and its consequences, poultry diseases and prevention; poultry diseases, preventive measures, vaccination programmes for broilers, layers and parent stocks, bio-security in poultry farming, miscellaneous poultry production (ducks, geese turkeys and others ; breeds for production and breeding purposes, management practices, egg quality and processing; structure and nutrient composition, egg quality characteristics, grading and preservation of eggs, broiler meat processing and preservation; processing techniques, factors affecting poultry meat quality and yield, inspection and grading.

Practical Identification of poultry breeds, selection of eggs for incubation, candling of hatching eggs, analysis of hatchability problems.

LP 31063 (3: 30/30) Quality Management of Food Processing and Handling

Theory Basic quality concepts; introduction to quality assurance, Codex Alimentarius basic document in food hygiene, Food Act (1980), food safety management procedures; GMP, cleaning and disinfection, personal hygiene, integrated pest management, training and supervisory management, design and construction of food premises and equipment, hazard analysis and critical control point (HACCP); HACCP concept, HACCP inspection procedure, good agricultural practices (GAP); EUREPGAP, ISO22000; ISO 9000 quality management system; total quality management, HACCP; HACCP concept, HACCP inspection Procedure, ISO22000; food safety audit system; other management systems; ISO14000 environmental management system, SA 8000 social responsible system, OHSAS 8000 occupational health and safety management system, food safety management procedures; GMP, cleaning and disinfection, personal hygiene, integrated pest management, training and supervisory management, design and construction of food premises and equipment, HACCP; HACCP concept, HACCP inspection procedure; ISO 9000 quality management system; total quality management, ISO22000; code of practices of Sri Lanka standards institute (SLSI) for food safety assurance system; SLS 143-code of practices for general food hygiene, SLS 872-code of practices for dairy industries, SLS 892-code of practices for processing of poultry, SLS 1065-code of practices for processed meat products, food safety management procedures; GMP, cleaning anddisinfection, personal hygiene, integrated pest management, training and supervisory management, design and construction of food premises and equipment, HACCP; HACCP concept, HACCP inspection procedure, ISO 9000 quality management system; total quality management, ISO22000; code of practices of SLSI for food safety assurance system; SLS 143-code of practices for general food hygiene, SLS 872 - code of practices for dairy industries, SLS 892 - code of practices for processing of poultry, SLS 1065-code of practices for processed meat products.

Practical Preparation of HACCP plan for a given food industry, quality inspection procedure of a fish processing factory, determination of water quality, quality of raw materials, determine the effectiveness of sanitation procedure and sanitizers of different food industries.

LP 31072 (2: 15/30) Swine Production

Theory Introduction to global swine industry; history and present status of global swine industry, introduction to swine industry in Sri Lanka; history and the present status of swine industry, role and potentials of pig production, constraints andremedies of swine industry, continuous pork production; aims of swine production, planning a pig operation, establishment of a piggery, maintain a piggery for a continuous production, breeding of pig; selection of a breeding stock, selection of boar, selection of sow, development of specific traits for different types of production,

management of breeding stock, management of animals in different stages; housing and feeding management of pregnant sow, boar, piglets and fatteners, record keeping in swine production; importance of record keeping in a swine farm, types of records to be maintained, diseases of swine; common diseases of pig (bacterial, viral, parasitic and nutritional), pathology, diagnosis and treatment, prevention and control of diseases; preventive and control measures, vaccination, slaughtering of pigs; procedure of slaughtering, carcass quality and important cuts, sources of environmental pollution in a swine farm; sources of pollution, needs of environmental pollution management, public health hazards associated with pig farming, minimizing environmental pollution; environmental impact assessment, steps to be taken to minimize environmental pollution, legal aspects of pig farming, waste disposal in a piggery; types of waste generated in a swine farm, methods of handling waste, environmental impact of waste in-proper waste management.

Practical Management of breeding stock, piglets, fatteners and boars, investigation of common clinical problems in pig farms, slaughtering techniques in swine, plan a bio gas unit for a piggery with a given capacity.

LP 32022 (2: 15/30) Animal Breeding

Theory Domestic animals and zootechnical systematic; domestication, the wild ancestors of domestic animals, changes caused by domestication zoo technical systematic breeds, lines, supra breeds etc, conformation-preliminary information; standard nomenclature of external conformation in domestic animals conformation standards, the constitution, methods of estimating and describing conformation, zoometrical measurements; measuring procedure, animal identification, growth and development of farm animals; definition, prenatal growth and development, postnatal growth, estimation of the variation of growth and development, genetic principles in animal breeding; heritability, repeatability and methods of estimation of heritability and repeatability; phenotypic genetic and environmental correlations variation, source, relationship; pedigrees, the measure of relationship, inbreeding, coefficient of inbreeding, principles of production recordings, practical animal breeding, breeding value; estimation of breeding value on own performance, estimation of breeding value on performance of ancestors, collateral relatives, progeny test, selection; herd remount, selection differential, genetic gain, selection intensity, selection limits selection criteria, individual selection, mass selection, selection methods-tendem selection, independent culling, index selection etc, livestock improvement; breeding methods: inbreeding, objectives of inbreeding, inbreeding in groups out breeding and crossbreeding, heterosis and hybrid vigour upgrading, rotational crossbreeding, alternate crossing, cross breeding for production, livestock improvement; breeding methods: inbreeding, objectives of inbreeding, inbreeding in groups out breeding and crossbreeding, heterosis and hybrid vigour upgrading, rotational crossbreeding, alternate crossing, cross breeding for production, livestock breeding in Sri Lanka; role of animal breeding in livestock production opportunities for breeding and improvement of farm animals in Sri Lanka, constraints in improving the productivity of livestock under traditional breeding, new technologies in animal breeding; production of transgenic livestock, modification of production traits.

Practical Preparation a breeding plan for livestock, estimation of coefficient of breeding parameters, prepare a plan for a formation of new breed, practical animal breeding, breeding value; estimation of breeding value on own performance, estimation of breeding value on performance of ancestors, collateral relatives, progeny test.

LP 32042 (2: 15/30) Applied Animal Nutrition

Theory Introduction to applied animal nutrition; introduction to applied animal nutrition, present status of the animal feed industry in Sri Lanka, feeding of ruminants and non-ruminants; feeding standards of ruminants and non-ruminants, nutrient requirements of farm animals; nutrient requirements for maintenance, growth, production and reproduction, regulation of feed intake; regulation of feed intake, physiological regulation, metabolic regulation and thermostatic regulation, factors affecting on feed intake, effect of animal factors on feed intake, influence of management activities on feed intake, effect of forage quality on feed intake and influence of environmental factors on feed intake, nutritional disorders; nutritional disorders such as milk fever, ketosis, bloat, grass tetany and displaced abomasum, agro-industrial by products; utilization of agro-industrial by products and non-conventional feedstuffs, types of agro-industrial by-products, plant by-products, cereals, pulses, plantation, fruit by-products, animal by-products, waste products, non-conventional feedstuffs etc. feeding of agricultural by-products and economic significance of agro-industrial by products as alternate feed resources, Feed manipulation and upgrading; feed manipulation and upgrading, importance of feed manipulation and upgrading, method of feedstuff upgrading, physical treatment, thermal treatment, chemical treatment, biological treatment, supplementation and genetic manipulation, impact of upgrading on nutritive quality, Ration formulation and ration manufacturing; ration formulation and ration manufacturing, importance of ration formulation, important facts on feed formulations, types and features of rations, methods of ration formulation, methods of ration manufacturing, constraints in ration formulation, feed laws; feed laws, rules and regulations, feed registration, labeling, and government inspection, feed tag label requirements, impact of animal nutrition on the environment.

Practical Feed processing and upgrading techniques, application of physical treatments, application of chemical treatments, application of biological treatments, ration formulation and ration manufacturing, recipe calculation and ingredients selection for a broiler or layer ration, practice of hand mixing. detection of the quality, preparation of feed supplement, preparation molasses urea mineral block, feeding trials for farm animals, visit to feed processing and manufacturing factories- observation of feed ingredient quality determination, observation of feed processing and handling techniques., observation of manufacturing various feeds, observation of feed quality determination, observation of maintenance of a safer factory environment, observation of utilities and services, observation of factory layout and the establishment of equipment and other units.

LP 32052 (2:15/30) Aquatic Bio-resource Production

Theory Production aspects of freshwater finfish culture; feeds and nutrition, juveniles and

grower culture, special culture requirements and breeding, species of interest; one species of Indian carps and tilapia, one underutilized fish species (endogenous and endemic fish species), production aspects brackish water and marine finfish culture; feeds and nutrition, juveniles and grower culture, special culture requirements and breeding, species of interest; barramundi and tuna, underutilized fish species (endogenous and endemic fish species), production aspects freshwater, brackish water and marine shell-fish culture; feeds and nutrition, juveniles and grower culture, special culture requirements breeding, Species of interest; mussels and oysters, shrimps and prawns.

Practical One species of Indian carps and tilapia, production aspects of endemic and endogenous freshwater fish, Production aspects of barramundi and tuna, production aspects of underutilized fish species (endogenous and endemic fish species), production aspects of mussels and oysters, production aspects of shrimps and prawns.

LP 32064 (4:30/60) Dairy Science and Technology

Theory Introduction to dairy science and technology; history of milk, potential of milk, present status and future trend of milk and dairy products and their consumption, milk composition; milk constituents, importance of milk composition, factors effect on milk composition and nutritional aspects of fresh milk, Physiochemical features of fresh milk; physical properties of fresh milk, chemical properties of fresh milk and importance of physiochemical features of fresh milk, milk processing; collection and reception of milk, clarification, separation, membrane processing, standardisation, homogenization, pasteurization, sterilization, evaporation and dehydration, dairy microbiology; microbiology and dairy microbiology, sources of microorganisms in milk, microorganisms in milk, change of micro-flora of milk during storage, factors affecting on the growth and survival of microbes in milk, detection and enumeration of bacteria, microbiology of dairy productsanduse of microbes, spoilage of milkandmilk borne diseases, microbiological standards of dairy products and detection of microbes, dairy factory and the environment; principles for the establishment of a dairy plant, maintenance of a safe environment, utilities, services and disposal of liquid and solid wastes, dairy products manufacturing; manufacturing of fluid milk products, concentrated and dried milk products, cultured milk products and creamer milk products, quality assurance of fresh milk and milk products; production, adulteration of milk, milk grading and defects, analysis of fresh milk qualities, quality assurance of milk products - total quality management, sensory evaluation of dairy product, quality defects of dairy products.

Practical Analysis of fresh milk qualities; qualitative analysis of fresh milk - sampling techniques of milk for analysis, identification of milk collection equipment, analysis of organoleptic qualities, microscopic observation of fresh milk, judging and grading of fresh milk based on ssensory evaluation, quantitative analysis of fresh milk-analysis of milk properties and analysis of milk composition, practice of aseptic handlings in dairy manufacturing, study of milk processing equipment, preparation of standardized milk for various dairy products, analysis

of microbiological qualities of fresh milk and various dairy products, detection and enumeration of milk bore bacteria, preparation of dairy cultures, visit to milk processing and manufacturing factories for critical evaluation of various units, manufacturing of fluid milk products, manufacturing of concentrated dairy products, manufacturing of cultured dairy products and manufacturing of creamy dairy products, identification of packaging material, detection of adulterants and preservatives in milk, grading of fresh milk, examination of quality defects of various dairy products.

LP 32073 (3:30/30) Meat Science and Technology

Theory Meat industry in the world; present status of global meat industry, meat industry in Sri Lanka; introduction to meat industry in Sri Lanka, importance and constraints of the meat industry in Sri Lanka, meat marketing system in sri lanka, structure of Meat; food animals, gross structure of muscle, characters of meat and fat in different animal species, microscopic structure of muscle, quality of meat; composition of meat, factors affecting composition of meat, nutritive value of meat, conversion of muscle to meat; post mortem glycolysis, rigor mortis, denaturation of muscle, ageing of meat, eating qualities of meat, factors affecting eating qualities, production of good quality Meat; pre slaughter handling of animals, ante-mortem inspection, slaughtering techniques, post mortem inspection, preservation of meat; important factors in meat preservation, different methods of preserving meat, processing of meat; sausage and meat balls production, ham /bacon production, abattoir and abattoir; selection of a site, components of an abattoir, legislations related to abattoir designing, designing a processing plant; designing a meat processing plant for a given capacity, meat hygiene; meat hygiene practices during transport of livestock and at the lairage, chemical and antibiotic residues in meat, health hazards due to meat consumption; possible hazardous biological agents and chemical compounds, health problems associated with consumption of contaminated meat, antibiotic resistance in meat microbes, Measures to reduce health hazards; methods to reduce health hazardous agent in meat, Production of low cholesterol meat; health hazards due to cholesterol, cholesterol depressing factors, methods of producing low cholesterol meat.

Practical Surveys on meat consumption of people, evaluate the nutritive value of meat, examine post mortem changes of meat, animal slaughtering and post mortem inspection in a slaughter house, production of sausages, meat balls, ham and bacon, visit a meat processing plant, evaluating microbial quality of meat, abstracts, investigation on different compounds and conditions in meat processing on reducing the contaminants, evaluate nutritive value and cholesterol contents of meat.

LP 32012 (2:15/30) Animal Biotechnology

Theory Introduction; introduction to the animal cell culture laboratory, sterilization, basic equipments, hazards and safety, history, limitations, opportunitiesand challenges; historical perspectives, contemporary and future of biotechnology, list down major techniques and their principles, biotechnology laboratory set-up,

introduction; organism and cell, basics in animal cell culture; media preparation, role of important components of culture media, troubleshooting cell culture, applications in mammals; advances in cell culture, products obtained from animal cells, opportunities and challengers, introduction; what is synthetic biology, recent advances in synthetic biology, opportunities and challengers, applications of synthetic biology, introduction; history and opportunities and challengers, what is recombinant technology, principles of DNA technology; major steps involved in the technology, rDNA, applications of RNA technology; uses and importance, model organisms in biotechnology; what are the model organisms, significance of model organism, introduction; development in livestock genomics, types of molecular markers, classification of molecular markers, applications of molecular markers; research and disease screening, novel applications, introduction; biotechnological utilization of male and female reproductive potential, theoretical basis of ovarian biotechnology; preparation of media and stock solutions, collection of ovariesand recovery of oocytes, oocyte selection, oocyte-cumulus cell interactions, parthenogenetic activation of oocytes, IVM of oocytes, assessment of cumulus expansion, factors affecting IVM of oocytes, theoretical basis of sperm biotechnology; processing semen, sperm treatment and capacitation, IVF, embryo development, cryopreservation, social concerns; if the blending of animaland human DNA results, intentionally or not, in chimeric entities possessing degrees of intelligence or sentience never before seen in nonhuman animals, should these entities be given rights and special protections?, what, if any, social and legal controls or reviews should be placed on such research?, what unintended personal, social and cultural consequences could result?, who will have access to these technologies and how will scarce resources such as medical advances and novel treatments be allocated? what, if any, health risks are associated with transgenics and genetically modified foods?, are there long-term effects on the environment, when transgenic or genetically modified organized are released in the field?, should research be limited and, if so, how should the limits be decided?, how should the limits be enforced nationally and internationally?, are there fundamental issues with creating new species?, are species boundaries or should they be viewed as a continuum? what, if any, consequences are there of blurring species boundaries?, are chimeras and transgenics more likely to suffer than traditional organisms?, will transgenic interventions in humans create physical or behavioral traits that may or may not be readily distinguished from what is usually perceived to be human?, what, if any, research in genetic engineering should be considered morally impermissible and banned (e.g., research undertaken for purely offensive military purposes)?, will these interventions redefine what it means to be normal?

LP 32032 (2: 15/30) Applications of Aquatic Bio-resource Management

Theory Fish stock depletions; lessons from the past; international stock depletion case studies 1-5, stock assessment data from the recent past and measures taken to avoid stock depletions, local case studies about stock depletions and counter-measures, Failures and success stories; coastal zone management, lagoon and mangrove ecosystems management, freshwater ecosystem management, effluent management and pollution control, biodiversity conservation in aquatic ecosystems alien species introductions, aquatic bio resource management models for given

situations; high input models Vs low input models, open access Vs restricted access models, uncontrolled harvesting systems Vs quota systems, external forces on sustainable aquatic resources utilization model, role of economics in aquatic bio resource management; role of economics in aquatic bio resource management.

Practical Model studies of fish stock assessment and simulations, developing aquatic bio resource management models for given situations.

LP 32082 (2: 15/30) Risk Assessment and Food Safety Management in Fishery Product

Theory Food-borne illnesses / hazards related to fishery products; physical hazards, allergens and other chemical hazards, microbial hazards, common characteristics of food-borne illnesses from fishery products, Risk assessment; risk assessment process, hazard identification, hazard characterization, exposure assessment, risk characterization, quantitative and qualitative risk assessments, risk management, risk communication, case studies on risk assessments in fishery products around the globe; case studies on risk assessments in fishery products around the globe, Selecting a suitable safety management system for a fishery product; minimizing food-borne illnesses in fishery products, food safety as a global concern and relevance of fishery products to food borne illnesses, global food safety initiatives in fishery products, SLS, ISO, BRC, MSC, IFS in fishery products, integrated food safety management approaches in fishery products.

Practical Examples of quantitative and qualitative risk assessments in fishery products, case studies on different food safety management systems and their suitability for fishery products.

LP 32092 (2: 15/30) Zoonoses and Public Health

Theory Emerging zoonotic diseases; the teaching strategy for this course will be based primarily on student seminars, in which each student will be assigned a specific geographical region, from which he/she will describe the 2 most important emerging zoonotic diseases in a 30-minutes presentation. each week, one geographical region will be discussed. students will briefly describe the epidemiological data (distribution, prevalence, incidence, outbreaks, morbidity, mortality, etc) and major epidemiological differences of such diseases, highlighting differences as well as potential risks for the Sri Lanka. other participants will bring at least one peer reviewed paper related to a ZD of public health significance from the particular geographical area under discussion, and will share their findings from the selected paper in an open dialogue. In addition, each student (except the student presenting) will turn in an outlined summary of the article, highlighting the public health significance, and why the article was chosen. supplemental assigned readings will be used to expand the information in a specific pertinent topic. Public health concerns in zoonotic diseases; the teaching strategy for this course will be based primarily on student seminars, in which each student will be assigned a specific geographical region, from which he/she will describe the 2 most important emerging zoonotic diseases in a 30-minutes presentation. each week, one geographical region will be discussed. Students will briefly describe the

epidemiological data (distribution, prevalence, incidence, outbreaks, morbidity, mortality, etc) and major epidemiological differences of such diseases, highlighting differences as well as potential risks for the Sri Lanka. other participants will bring at least one peer reviewed paper related to a ZD of public health significance from the particular geographical area under discussion, and will share their findings from the selected paper in an open dialogue. in addition, each student (except the student presenting) will turn in an outlined summary of the article, highlighting the public health significance, and why the article was chosen. supplemental assigned readings will be used to expand the information in a specific pertinent topic. introduction; definitions for zoonosis, public health, occupational health. strategies adapted for prevent or minimize zoonosis spread, common zoonotic diseases; common zoonotic conditions and clinical signs and diagnosis, health and safety; education and frequent screening and treatment methods, introduction; definitions for prevention and control methods, Strategies, monitoring and record keeping strategies, monitoring and record keeping; mode of application of preventive and control strategies in important diseases, farm sanitation and cleanliness, biosecurity, probiotics, prebiotics, stress control, vaccination, genetics and breeding, water, routing management practices, evaluation and screening; methods of reporting, monitoring and assessment of strategies adapted, introduction; definitions for disease outbreak, epidemic, endemic, pandemic, contagious, infectious and examples for each situation, economic and social impact, national and international law; animal disease act in Sri Lanka, OIE regulations, reporting and screening authority; local and international agencies dealing with animal health regulation and disease control.

Practical Case study: 1, Case study: 2

LP 41023 (3:30/30) Animal Reproduction and Assisted Reproductive Technologies

Theory Fundamentals in reproductive physiology, anatomy and embryology; basic concepts in male and female reproductive physiology, anatomy, species differences, different reproductive phenomena, embryology of genitourinary system, cellular and molecular basis of reproduction in farm animal and endocrinology; cellular organization and hormonal influences during gametogenesis, luteogenesis, fertilization, implantation, gastrulation, embryogenesis, fetogenesis, pregnancy and parturition, sub fertility, infertility, abnormalities in developmental biology and obstetrical assistance; reproductive abnormalities and interventions and their economic significance, Basic concepts in assisted reproduction and reproductive manipulation in farm animals; artificial insemination, estrus synchronization, embryo transfer, cryopreservation, vitrification, in-vitro growth (IVG), in-vitro maturation (IVM), in-vitro fertilization (IVF), cloning, enucleation, SCNT, stem cells, IPS cells, xenotransplantation, Advanced concepts in ovary and oocyte culture procedures in assisted reproduction and reproductive manipulation in farm animals; laboratory setup for cell culture, principles in oocyte isolation, incubation for growth and maturation, aseptic media preparation, histological study, oocyte staining and processing, interpretation and germinal vesicle breakdown (GVBD).

Practical Identification of the parts of male and female reproductive systems and their functional significance, study breeding soundness of male animals, Identification and differentiation of gametes in various species, Identification and instrumentation of artificial insemination, step by step process of artificial insemination procedure in cattle, preparation of basic working media and culture media, dissection of mouse/rat for whole ovary isolation and culture, dissection of pig ovary for follicle and oocyte isolation.

LP 41082 (2:15/30) Health Management of Livestock Species and Fish

Theory Principles of health management; introduction to herd health, introduction to herd health management, basic principles of herd health management, economical importance of herd health and hygiene of livestock species; economical importance of herd health management, roles of disease control measures in the development of the livestock sector, economic assessment of productivity and health status of animals, general introduction to common pathogens; general introduction to common pathogens, basic concepts of pathogenesis, concept of disease, common diseases in livestock species (cattle, sheep, goat, poultry, swine and fish); common viral, bacterial diseases and parasitic infestations, nutritional and metabolic disorders, infection and immunity (large animal, poultry, fin fish and crustacean); functional elements of the immune system, the dynamic equilibrium between positive and negative factors which influence the health status of animal populations, factors which influence host-pathogen interaction, comparative aspects of non-specific and specific immunity, the role of phagocytic cells in non-specific immune responses, specific immunity, vaccination, vaccination failure, disease diagnosis; steps in disease diagnosis, principles of clinical examination of animals, clinical examination by body systems, diagnostic techniques; introduction to laboratory diagnostic methods, types of samples for disease diagnosis, sample collection, hematological methods, serological methods, fecal and urine analysis, investigation of body fluids, treatments for sick animals; common treatment plans, commonly used drugs in livestock production, mode of action of drugs, routes of drug administration, disease prevention and control; management of farm hygiene, effect of environment on animal health, effect of housingand feeding on health, environmental risk factors in associated with diseases, zoonotic diseases and control of zoonotic diseases; roles of animals as infection sources of human, control of spreading zoonotic diseases, bio-security measures; maintaining bio-security in a livestock farm, designing a herd health plan; factors affecting herd healthand control points, importance of herd health plan in livestock, disease surveillance and monitoring; introduction to animal disease surveillance, characteristics of surveillance, options of surveillance, importance of surveillance in disease controlling, concepts and principles of surveillance, basic components of surveillance, monitoring of diseases.

Practical Identifying economical losses associated with livestock animals in a given area by developing a questionnaire, identifying major health problems associated with livestock animals in a given area by developing a questionnaire, general clinical examination of livestock species, collection of samples for laboratory diagnosis, hematological techniques used in diagnosis, urinalysis, fecal analysis and body

tissue handling, Identifying commonly used medicines in livestock production, managing of minor clinical cases (wound management, control of ecto-parasites, control of endo-parasites etc), conducting farmer awareness programme for proper health management in a livestock farm and on controlling zoonotic diseases, design a herd health plan to be established in a livestock farm with multi species, designing a surveillance system, designing a evaluation system for surveillance.

LP 41122 (2: 30/00) Proposal Formulation and Scientific Writing

Theory General statement of the problem to be investigated; to establish your area of interest, Justification of the study; to explain why the problem is worth studying, a specific statement of the problem; to clarify the question you are trying to answer, definition of key terms/constructs used; to avoid to any ambiguity of reference, Statement of the overall purpose of the research; to make clear what will be achieved as a result of the study, critical analysis of the relevant literature; set out the main issues arising from the literature, comment on any conflicting findings, demonstrate the gap in knowledge which the researcher hopes to fill, an explicit statement of the research questions/hypotheses; to let the leader know exactly what variables and relationships you will be investigating, an outline of the approach to be used and procedures to be followed; describe the explain how data will be used and procedures to be followed, show that the approach chosen is appropriate to the problem, explain the theoretical framework to be used and the reason for the choice, explain how the sample/subjects will be selected and why, a report on any pilot study conducted; to support your choice of methodology, an ethics approval form; to demonstrate an awareness of the responsibility to the subjects, a detailed time table; to show that the research can be completed in the time allowed, a detailed time table; to show that the research can be completed in the time allowed, a list of all sources referred to in the proposal.

LP 41012 (2:15/30) Animal Behavior and Welfare

Theory Introduction to animal behavior; definitions and concepts of animal behavior, introduction to animal welfare; definitions and concepts of animal welfare, introduction to five freedoms, evolution and behavioural genetics; variation, heritability,selection, optimality and efficiency, domestication, motivation and regulation of behavior; factors affect on motivation, motivational state, motivation concept, monitoring motivation, motivation and other behaviour control system, locomotion and gaits; walk, trot, canter and gallop, jump, distance travel, need for exercise, learning and cognition; predisposition to learn, habituation and sensitization, experimental learning studies, specific aspects of behavours; feeding behaviour, territoriality and spacing, parental behaviour, social behaviour, reproduction behavior, exploration, abnormal behaviours, behaviour towards predators, rest and sleep, juvenile and play behavior, introduction to studying behavior; preliminary observations, describing behavior, types of measures, event and state, different level of measurements, recording methods; sampling rules, recording rules, continuous recording, instantaneous sampling, one-zero, sampling, sample interval, analyzing specific aspects of behavior; bout length, analyzing sequence and rhythm, choice test, animal welfare assessment; introduction to

measures of welfare, physiological measures, behavioural measures, animal pain, distress and suffering; concepts of pain, distress and suffering and it's relation to animal welfare, measures of pain, major issues related to farm animal welfare; housing, handling, transportation, slaughtering, diseases and injuries, human animal interaction; concept of human animal relationship and its assessment, effect of stockperson on animal welfare and productivity, development of human animal relationship, welfare of laboratory, zoo and domestic animals; introduction to 3R concept, handling techniques of laboratory animals, demonstrations of anesthesia, analgesia and euthanasia (rabbits, gunia pigs, rats, poultry), welfare issues of zoo and domestic animals, legislations in animal welfare; welfare code systems for different farm animals, ethical issues of use of animals in experiments.

Practical Welfare assessment of animal, problem analysis, farm practices, food production.

LP 41032 (2:15/30) Biodiversity Management

Theory Introduction to biodiversity; levels of biodiversity, alpha beta and gamma diversity, bio diversity of Sri Lanka, assessment and monitoring of biodiversity; field data recording techniques, plant identification, preparation of herbarium specimens, floral sampling methods (quadrates, plot less transects), faunal identification, visual encounter surveys, monitoring of animal populations; (sampling and basic statistical methods, relative and absolute abundance, census and estimates, survey designs), animal population census (total counts territory mapping) and survey technique (indices of abundance transects, point counts) species area curves, detection probability, distance sampling, mark and recapture and removal techniques, indirect sampling methods, studying animal behavior, introduction to biodiversity conservation; values of biodiversity, loss of biodiversity, insitu and exsitu conservation, protected area network in Sri Lanka, global and national conservation initiatives, historical development of forest and wildlife conservation in Sri Lanka, policy aspects; fauna and flora protection ordinance, forest ordinance, forestry master plan national biodiversity, conservation action plan, multinational environmental agreements (CB, RAMSAR, CITES and CMS), principles and approaches of " conservation biology".

Practical Assesment of biodiversity and its conservation in Sri Lanka.

LP 41042 (2:15/30) Cereal Science and Technology

Theory Wheat production processing and utilization; origin and production, wheat tradeand consumption, classification and grading, wheat processing, rice production processing and utilization; origin and production, rice type and their determination, rice milling, rice quality and grading standard, rice parboiling, utilization of rice as food and feed, production, processing and utilization of corn; origin and production, types and composition, quality and grading standard, utilization as food and feed, corn milling, Production, processing and utilization of sorghum; origin and production, composition, industrial utilization of sorghum, processing for livestock feed, cereal carbohydrate; properties of starch and non-starch polysaccharides, cereal proteins; composition and properties of proteins, cereal lipids; free and bound lipids. non starch lipids, free fatty acids composition,

nonsaponifiable lipids, lipids in structural parts, Minor constituents; vitamins, minerals, enzymes, pigments, nutritional related components, breads and yeast-leavened bakery products; bread- baking industry trend, dough processing, production steps of bread, bread quality parameters, processing of other yeast-leavned products (bun rolls, noodles)andtheir quality parameters, cereal based snaked products; cookies and biscuits, extruded snacks and other cereal snacks, malted cereals their production and uses; malting process, the brewing process, baking applications, malts in distilled sprits, Health beneficial compounds in cereals; health beneficial phytochemicals in cereal, cereal resistant starch.

Practical Determination of rice grain quality, determination of rice carbohydrates, proteins and lipids from diverse varieties grown in Sri Lanka, processing and quality evaluation of bread, bun and noodles and a filed visit to IPTS Anuradhapura, determination of antioxidant capacity of different varieties, estimation of resistant starch content of rice.

LP 41052 (2:15/30) Cleaner Production

Theory Introduction; define cleaner production, resource depletion and global environmental issues, introduction to cleaner production assessment, cleaner production process flow diagrams; quantification of resource flows; data collection, in-situ measurements, material balance, costing of resource flows; costing of inputs (initial investment, processing cost, raw materials), costing of waste, waste causes analysis, costing, generation of CP options based on waste causes and CP techniques develop CP options and feasibility analysis; feasibility analysis, technical feasibility, financial feasibility, environmental feasibility, CP techniques; input substitution, good housekeeping, better control process, product modification, equipment modification, technology change, on site recover/reuse, development of useful by-products, CP techniques; input substitution, good housekeeping, better control process, product modification, equipment modification, technology change, on site recover/reuse, development of useful by-products, implementation and sustaining of CP and other concepts for achievement of sustainable development.

Practical Assessment of applications of cleaner production in Agriculture.

LP 41062 (2:15/30) Extractive and Sustainable Aquaculture

Theory General aspects of resource degradation in aquaculture; reasons for resource degradation by aquaculture, environmental problems in aquaculture and mitigatory measures; environmental problems in aquaculture, their mitigation, concepts and detailed analysis of fish integration;, suitability and the role of fish as a component in integration systems, fish integration systems with terrestrial farming; crop and fish integration systems, livestock and fish integration systems, livestock-crop-fish integration systems, fish as a component in agro and ecotourism, fish integration systems in marine systems; integrated multi-trophic aquaculture (IMTA) and multi-species aquaculture, extractive aquaculture.

Practical Environmental problems in aquaculture and their mitigation, terrestrial systems with fish integration, fish in agro and ecotourism.

LP 41093 (3:15/60) Laboratory Techniques in Livestock Production

Theory Identifying Laboratory techniques used in livestock production, discuss the laboratory hazards, safety measures and first aid procedures; types of laboratories, orientation to the laboratory and rules of conduct, general laboratory techniques used in the livestock production, laboratory hazards, Introduction to laboratory safety and its importance; laboratory safety and importance of safety measures, occupational hazards, general laboratory procedures and safety rules; laboratory policies and procedures, laboratory safety, emergency response, personal and general laboratory safety, safety inspection of labs, safety measures and first aid; safety measures, safety equipment, emergency equipment, emergency response plan, first aid methods, responsibilities of laboratory personnels; responsibilities of laboratory supervisor, responsibilities of laboratory technician, responsibilities of laboratory attendance, responsibilities of administrative officers, types of waste generated in a laboratory; identifying hazardous wastes, methods of waste management; planning for pollution prevention, facility management, waste reduction, waste disposal, reuse of laboratory wastes, recycling of laboratory waste, Introduction to basic laboratory techniques in LP; perform routine laboratory math calculations, identification of types of glass ware and common chemicals, preparation of solutions, maintain and control of stocks, Introduction to equipment used in LP; introduction to the principles of commonly used laboratory equipment (eg. microscope, spectrophotometer, centrifuge, autoclave, lamina flow etc) and their proper use basic care and maintenance procedures of laboratory instruments, perform standard calibrations of equipment (thermometers, micro pipette, analytical balance, ph meter, refractometer etc), basic laboratory skills including pipetting, microscope use, autoclaving etc, fundamentals of phlebotomy; defining phlebotomy, devices for phlebotomy, universal precautions and biosafety techniques in phlebotomy, applied phlebotomy and sample (clinical sample and non clinical sample) collection; types of samples to be collected in a livestock laboratory, sampling sites and sampling procedures, phlebotomy andcollection of other samples, sample labelling, storage and transportation to the laboratory, heamatolog; introduction to hematology, components of blood, blood collection, anticoagulants, preparation of blood smears, staining of blood smears, hemocytometry, differential leucocyte count, reticulocyte count, hemoglobin, packed cell volume, red cell indices, erythrocyte sedimentation rate, bone marrow smear examination, red cell morphology study, anemia, hemostasis, automation in hematology, immunological techniques; characteristics and functions of the components of the immune system, antigen/antibody reactions, principles of various testing systems used for immunological procedures (eg. ELISA, immune histochemestry etc) and correlate immunological tests results to diagnostic significance, chemical pathology; liver function tests and kidney function tests, investigation of some components such as glucose, proteins, cholesterol in blood sample, fecal investigation; physical investigation of fecal sample, qualitative and quantitative investigation of fecal sample, microbiological investigation of fecal sample, correlate the laboratory findings with clinical significance, Urine investigation; introduction to structure and function of the urinary tract, identify, analyze, and report, physical and chemical properties and constituents in urine, explain abnormal findings in urine and correlate these with diseases or disorders,

histopathology; sectioning of tissues, staining of tissues, identification of normal and abnormal cell types interpretation of findings, Cell culture; types of cell lines, growth of cells, advances of cell culture techniques, significance of cell culture, Isolation and identification of bacteria; general introduction to important microbes in LP, microbial growth and nutrition, sterilization, disinfection and antisepsis, culturing techniques of microbes, enumeration of microbes, isolation of microbes (gram positive and gram negative) from various samples (clinical, food, meat, egg and fish),identification of microbes based on phenotypic and biochemical characteristics, determination of bacterial growth curve, mechanism of action of antimicrobial agents, antibiotic sensitivity test and water quality testing, analysis of quality of feed, meat and dairy products; analysis of microbiological quality, Basic molecular tools in LP; nucleic acid extraction and its principles, rapid identification techniques of microbes (eg. polymerase chain reaction) in lp, detecting diversity of microbes, quantification of microbial genes, basic principles of gene cloning, Introduction to bioinformatics; accessing nucleotide sequences, use of bioinformatics tools such as blast, clustalw, multi alignment, designing primers and nucleotide sequence analysis, post mortem examination; importance of post mortem examination, factors to be considered in post mortem examination, post mortem examination of large animal (cattle), post mortem examination of poultry, correlate findings with clinical case.

Practical Preparation of material safety data sheet (MSDS) to be used in a laboratory, preparation of first aid kit, demonstration of first aid methods, participate in laboratory workplace safety, demonstrate laboratory safety precautions concerning laboratory procedures, collection of waste to proper collectors and handing of waste in proper way, preparing a laboratory hazardous waste management guide, designing a waste treatment plant, handling of instrument such as microscope, preparation of solutions, calibration of instrument, sampling of urine, blood, fecal matter, food, water, milk, meat, fish and egg, blood sample collection, Preparation of blood smears, staining of blood smears, differential cell count, erythrocytes count, leucocyte counts, reticulocyte count, measuring, haemoglobin concentration, packed cell volume, erythrocyte sedimentation rate, red cell morphology, calculation of red cell indices, interpretation of results with case studies, liver function tests, Kidney function tests, fecal analysis, urine analysis, histopathological, investigation, identifying cell culture techniques, isolation of identification of bacteria in a given sample, determination of growth curve of isolated bacteria, enumeration of bacteria in a given sample, antibiotic sensitivity testing, water quality testing, nucleic acid extraction, performing PCR and identifying specific organism, designing primers, use of bioinformatics tools, postmortem examination of large animal (cattle), postmortem examination of poultry, correlate findings with clinical case.

LP 41103 (3: 30/30) Ornamental Fish Culture

Theory Introduction to ornamental fish industry; ornamental fish industry in the world and in Sri Lanka, characteristics of small and large scale ornamental fish farming, past, present and future trends of the industry, potentials in Sri Lanka, industry swot for Sri Lanka and given local places, problems and limitations for expansion,

types and techniques of ornamental fish culture; marine and freshwater, indoor and outdoor, tropical and temperate, small and large-scale fish culture systems, planning, construction and maintenance of glass, concrete and other aquaria, indoor and outdoor ponds; production planning; importance of production plan as a tool in ornamental farm management, factors of consideration for production planning, production planning for livebearers, production planning for egg layers, types of ornamental fish, their breeds and maintenance; types of ornamental fish, their breeds and characteristics, broodstock management, breeding, hatchery management and larval rearing, nutrition and feeding, special feed formulations and live feed production technology, water quality testing and management, ornamental fish disease identification and management, fish conditioning, packaging and transport, cost-benefit analysis, case study, recent advances in ornamental fish industry, freshwater endemic fish species in Sri Lanka; identification and the status of freshwater endemic fish species in Sri Lanka, culture techniques of common endemic species, breeding techniques for endemic species, stock enhancement and conservation of freshwater endemic fish species, ornamental aquatic plants; uses, types and examples, culture techniques and tissue culture; introduction to ornamental aquatic plants, uses, advantages and limitations of ornamental aquatic plants, types of ornamental aquatic plants and their uses, common culture methods for ornamental aquatic plants recent advances in ornamental aquatic plants culture, aquascaping.

Practical Situation analysis of small scale and large scale ornamental fish farms, role play for starting up a new Orna-fish farm, field tours on small scale and large scale ornamental fish farms for types and techniques of ornamental fish culture, construction of glass aquaria and concrete tanks and their maintenance, production planning for fish types (egg layers and live bearers), ornamental fish varieties and their requirements, water quality testing and management, nutrition, feeds and feeding, broodstock management, breeding and larval rearing of ornamental fish, fish conditioning, packaging and transport, general management and breeding of freshwater endemic fish in Sri Lanka, identification and culturing of ornamental aquatic plants.

LP 41113 (3:30/30) Processing and Utilization of Animal Byproducts

Theory Introduction; definitions of animal byproduct, history of processing animal by products by- product categories, present status of animal byproducts in local and global level, rendering industry; products of rendering, uses of rendered materials, rendering systems, impact of rendering systems on product quality, comparison of rendering methods, processing of animal byproducts; processing of blood and utilization- introduction to blood and blood collection techniques, general properties of blood fraction in food, blood serum for laboratory use, processing of blood meal, blood albumin, red blood cell paste, spray dried blood and their utilization, feeding of whole blood, processing of organ meat and offal- processing of liver, heart, tongue, kidney, brains, oxtails, meat extracts and trimmings, pork jowl, pig tail, skin and feet, testicles, spleen, poultry giblets, use of intestines, bladder and stomach as sausage casingsand other products, processing of hide -introduction to trade in hide and leather, hide composition, hide fleshing, curing,

trimming, sorting, tanning, deliming, bating, tanning, dying, fatliquoring, drying, finishing, properties of leather, by products in poultry industry-feather meal, poultry by product meal, day old chick meal, ensiled poultry manure, by products of poultry eggs, hatchery waste, poultry grease and oil, sea food byproducts- fish meal, fish silage, fish oil and fish protein concentrates, cannery waste, oyster shell, by products in dairy industry, other potential products; pet feed, pharmaceuticals, enzymes and hormones, bone meal, lard and tallow, gelatin, environmental impact and global legislations of the animal byproduct industry; animal processing waste disposal and treatments, introduction to legislations in animal by product industry.

Practical Evaluation of the nutritive value of animal by products, processing of blood, organ meat, offal, wool, hair, hide and feather, production of lard and tallow.

LP 41132 (2:15/30) Recent Advances in Animal Bio-resource Production

Theory Introduction; define terminology and historical and contemporary perspective of bioresource production and technology, cellular and molecular basis of life; basic concepts in protein, nucleic acids and animal body, developmental biology and phenomic gap; biology, endocrinology and evolution in farm animals, introduction; define terms of genes, genome, genomics, proteomics, xenotransplantation and gene therapy, genomis; human and porcine genome study and impact of bioresource production. DNA in bioresource production, proteomics; proteomics and their role in advancement of bioresource production, transcriptome; concepts, RAN in bioresource production, Gene therapy concepts; concepts and prospects, novel applications, Introduction; human animal interphase studies, one health concept, evolution of abatement and mitigation strategies, Applications in bioresource production an overview; health and medicine, veterinary medicine and biomedical science andagriculture, food and feed, environment, energy, pharmaceuticals, forensic studies, animal waste, methane emission and mitigation, transgenic animals: generation of profoundly genetically modified organisms. sleeping beauty transposon system, cre-loxp-mediated cassette exchange, transgenic animals are ready to become industrial bioreactors for the preparation of pharmaceuticals in milk and probably in the future in egg white, gene knockout and knockdown strategies, transgenic production, xenotransplantation: concepts and prospects, Sri Lankan context and chronic, kidney disease of uncertain etiology (CKDu), Mesoamerican context and chronic kidney disease of nontraditional etiology (CKDnt), introduction; treads in isolation and identification of cells from various origins, the vaccine development and immunology, isolation of mammalian cells and manipulation; oocyte and ovary modal for VEGFA testing for biomedical research and farm animal production, cystic ovary of high producing cows, PCOS in human. cell culture, tissue culture and organ culture, vaccine development; immunology and contemporary issues, emerging technologies- pure recombinant or synthetic antigens used in modern day vaccines, vaccine adjuvants, methane emission; major sources of atmospheric methane, environmental and health related issues due to methane, mitigation strategies, introduction; present status in application of bioresource production both in the animals and human-animal interphase, animal waste and farm waste management; identify sources, reactions,

consequences of methane emission, mitigation and abatement, introduction; ethics and contemporary biology and biotechnology, guidelines; animal subjects: laboratory animals, farm animals, human subjects in biomedical use, social aspects in ethics; zero animal research?, artificial modal animals, membrane biology.

LP 42012 (2:00/200*) Industrial Training

Intended Learning Outcomes

- display attributes, skills, behaviour, and attitudes require at a work place.
- apply appropriate scientific principles and techniques in a dynamic working environment.
- demonstrate the ability to establish effective relationships with others, and to define, share and delegate responsibilities.
- display skills of professional scholarships required for personal development and career management

LP 42026 (6:00/600*) Research Project

- exhibit scientific writing ability.
- analyze the data using appropriate techniques.
- discuss and interpret the results and draw conclusions from the study carried out.
- draw policy implications based on the results of the study.

* *Notional Hours*

7 DEPARTMENT OF LIVESTOCK PRODUCTION

7.2 Module 02: Aquatic Bio-Resource Technology and Management

Courses of Specialization Programme Offered by the Department of Livestock Production

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year III Semester I	LP 31032	Food Microbiology	(2:15/30)	Compulsory
	LP 31063	Quality Management of Food Processing and Handling	(3:30/30)	
	LP 31083	Applied Fish Nutrition and Live Feed Technology	(3:30/30)	
	LP 31093	Biology of Aquatic Organisms	(3:30/30)	
	LP 31103	Fish Diseases and Health Management	(3:30/30)	
	LP 31113	Principles of Aquatic Bio-resource Management	(3:30/30)	
Year III Semester II	LP 32032	Applications of Aquatic Bio-resource Management	(2:15/30)	Compulsory
	LP 32082	Risk assessment and Food Safety Management in Fishery Products	(2:15/30)	
	LP 32103	Fishery Product Technology	(3:30/30)	
	LP 32113	Recent Advances in Biotechnology and Molecular Biology in Aquaculture	(3:30/30)	
	LP 32123	Technology of Fish Species Production	(3:30/30)	
	LP 32012	Animal Biotechnology	(2:15/30)	Elective
	LP 32022	Animal Breeding	(2:15/30)	
	LP 32042	Applied Animal Nutrition	(2:15/30)	
	LP 32092	Zoonoses and Public Health	(2:15/30)	

Courses of Specialization Programme Offered by the Department of Livestock Production (Cont.)

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year IV Semester I	LP 41072	Fish Breeding and Larviculture	(2:15/30)	Compulsory
	LP 41103	Ornamental Fish Culture	(3:30/30)	
	LP 41122	Proposal Formulation and Scientific Writing	(2:30/00)	
	LP 41012	Animal Behavior and Welfare	(2:15/30)	Elective
	LP 41032	Biodiversity Management	(2:15/30)	
	LP 41042	Cereal Science and Technology	(2:15/30)	
	LP 41052	Cleaner Production	(2:15/30)	
	LP 41062	Extractive and Sustainable Aquaculture	(2:15/30)	
	LP 41093	Laboratory Techniques in Livestock Production	(3:15/60)	
	LP 41113	Processing and Utilization of Animal Byproducts	(3:30/30)	
	LP 41132	Recent Advances in Animal Bio-resource Production	(2:15/30)	
Year IV Semester II	LP 42012	Industrial Training	(2:00/200*)	Compulsory
	LP 42026	Research Project	(6:00/600*)	

* *Notional Hours*

Course Capsules of the Module 02: Aquatic Bio-Resource Technology and Management

LP 31032 (2: 15/30) Food Microbiology

Theory Habitat and taxonomy; natural habitat of microbial biota and their role, bacterial taxonomy, primary sources of microorganism in foods, growth parameters; intrinsic and extrinsic factors affect on microbial growth, meat poultry and sea food; microbial spoilage of fresh meat, poultry and sea foods, vegetables and fruit products; spoilage of fresh and frozen vegetables and fruits, fermented dairy products; fermentation, lactic acid bacteria, probiotics and prebiotics, starter cultures and fermented dairy products, Non dairy fermented food products; microbiology of fermented meat, fish, bakery and plant products, chemical and biocontol; chemical preservatives, microbial interference, bacteriocins, endolysins, naturally occurring antimicrobial systems, food microbial quality and safety; microbial indicators of product quality and safety, HACCP and FSO systems for food safety, Food borne diseases; food infection and intoxication.

Practical General practices in food microbiology laboratory and aseptic handling of microbes, study on bacterial physiology, study on essential requirements for the growth of micro organisms, preparation of bacterial growth media, methods for controlling microbial growth (sterilizations methods etc) study on bacterial growth curve and factors affecting the growth, sampling procedures and handling and dispatching samples, identifying spoilage organisms by conventional methods, enumerating the microbial load in a food sample, study on different food preservation methods, detection of chemical residues in food products, isolation and identification of different microbes from food commodities (this covers all the basic microbiological methods in isolation and identification including, sampling, media preparation, methods of culturing organisms, enumerating techniques, staining procedures etc), confirmation of isolates by molecular tools, study on microbial quality of food items.

LP 31063 (3: 30/30) Quality Management of Food Processing and Handling

Theory Basic quality concepts; introduction to quality assurance, Codex Alimentarius basic document in food hygiene, Food Act (1980), food safety management procedures; GMP, cleaning and disinfection, personal hygiene, integrated pest management, training and supervisory management, design and construction of food premises and equipment, hazard analysis and critical control point (HACCP); HACCP concept, HACCP inspection procedure, good agricultural practices (GAP); EUREPGAP, ISO22000; ISO 9000 quality management system; total quality management, HACCP; HACCP concept, HACCP inspection Procedure, ISO22000; food safety audit system; other management systems; ISO14000 environmental management system, SA 8000 social responsible system, OHSAS 8000 occupational health and safety management system, food safety management procedures; GMP, cleaning and disinfection, personal hygiene, integrated pest management, training and supervisory management, design and construction of food premises and equipment,

HACCP; HACCP concept, HACCP inspection procedure; ISO 9000 quality management system; total quality management, ISO22000; code of practices of Sri Lanka standards institute (SLSI) for food safety assurance system; SLS 143-code of practices for general food hygiene, SLS 872-code of practices for dairy industries, SLS 892-code of practices for processing of poultry, SLS 1065-code of practices for processed meat products, food safety management procedures; GMP, cleaning anddisinfection, personal hygiene, integrated pest management, training and supervisory management, design and construction of food premises and equipment, HACCP; HACCP concept, HACCP inspection procedure, ISO 9000 quality management system; total quality management, ISO22000; code of practices of SLSI for food safety assurance system; SLS 143-code of practices for general food hygiene, SLS 872 - code of practices for dairy industries, SLS 892 - code of practices for processing of poultry, SLS 1065-code of practices for processed meat products.

Practical Preparation of HACCP plan for a given food industry, quality inspection procedure of a fish processing factory, determination of water quality, quality of raw materials, determine the effectiveness of sanitation procedure and sanitizers of different food industries.

LP 31083 (3: 30/30) Applied Fish Nutrition and Live Feed Technology

Theory Finfish and shellfish digestive systems; comparative digestive anatomy and physiology of finfish (herbivore, carnivore, planctivore, omnivore) and shell-fish (crustaceans and molluscs), nutritional requirements and feed utilization in fish; identification of feed utilization capacity of fish types (carnivore, planctivore, omnivore and molluscs) and stages, and their nutritional requirements (protein, carbohydrate, fat, vitamins and minerals, nutritional energetic), ration formulation, feed processing; conventional and unconventional feed ingredients, identifying nutritional requirements for fish types, species and stages, matching the requirements with ration formulation methods, feeds and feed formulations, feed processing, feed analysis (for components, utilization efficiency and quality); feed analysis (for components, utilization efficiency and quality, feed quality for improving intake, and diet modifications; factors affecting feed intake and effective feed utilization in fish, manipulating these factors for better feed conversion, complete and supplementary diets, feed fortification, encapsulation and supplementation, live feeds and their utilization in aquaculture; types of live feeds, their advantages, disadvantages and limitations in comparative context, culture, utilization, fortification and bio-encapsulation techniques, technology of Artemia, rotifers, microalgae, cladocerans, micro worms and other live feed species production and utilization.

Practical Comparative digestive anatomy of carnivore, planctivore, omnivore and molluscs, feed and ingredient analysis (for components, utilization efficiency and quality), ration formulation and feed processing, feed fortification, encapsulation and supplementation, culture, utilization, fortification and bio-encapsulation techniques for commercially culturable live feed species, culture, utilization, fortification and bio-encapsulation techniques for unconventional live feed.

LP 31093 (3: 30/30) Biology of Aquatic Organisms

Theory Detailed anatomy of finfish; comparative anatomy of cultured and harvested finfish species, biological systems of finfish (digestive system, reproductive system and osmoregulatory system) and their anatomical adaptations, detailed anatomy of shellfish; comparative anatomy of cultured and harvested crustaceans, molluscs, biological systems of shellfish (digestive system, reproduction system and osmoregulatory system) and their anatomical adaptations, biology of fish growth and development; definition and measurements of growth and development, endocrine control of fish growth and development, other factors controlling growth and development, biology of fish reproduction; fish reproduction and its relevance, measuring reproductive ability in fish, endocrine control of fish reproduction and hormonal manipulation of fish reproduction in aquaculture, implications of hormonal manipulation to fish and environment, biology of fish disease resistance; biology and physiology of fish diseases, disease resistance in finfish and shellfish, fish morphometrics and meristics; morphometric characters in fish, meristic characteristics in fish, use of morphometric and meristic characteristics in fish systematics, basic taxonomic levels and classification of fish species; taxonomy and cladistics in fish systematics, applied fish biology in finfish culture and shellfish culture; applications of fish biology on growth and development, applications of fish biology on reproduction, applications of fish biology on disease resistance.

Practical Comparative digestive and reproductive anatomy of finfish and shellfish, basic measurements of growth and development of finfish and shellfish, basic measurements of reproductive success in finfish and shellfish, morphometric and meristic trait measurements of finfish and shellfish, induced breeding of common food fish species.

LP 31103 (3: 30/30) Fish Diseases and Health Management

Theory Finfish diseases; economic significance, signs and diagnosis in food fish and ornamental fish, parasitic diseases, viral diseases, bacterial diseases, fungal diseases, metabolic disorders and other diseases, shellfish diseases; economic significance, signs and diagnosis, parasitic diseases, viral diseases, bacterial diseases, fungal diseases, metabolic disorders and other diseases, curing finfish diseases in food fish and ornamental fish; parasitic diseases, viral diseases, bacterial diseases, fungal diseases, metabolic disorders and other diseases, curing shellfish diseases; parasitic diseases, viral diseases, bacterial diseases, fungal diseases, metabolic disorders and other diseases, disease management; predisposing factors for aquatic diseases and their minimization, quarantine and its role in aquatic disease management, bio-security and its role in aquatic disease management, good agriculture/ aquaculture practices (GAP) and its role in aquatic disease management, water quality management and recirculation systems in disease management, nutrition and waste management in aquaculture and their role in aquatic disease management, integrated disease management systems.

Practical Evaluation of fish health, identification and diagnosis of common finfish diseases, identification and diagnosis of common shellfish diseases, preparation of fish treatments, hospital tank concept, isolation and treatment of infected fish,

prophylactic treatments and recovering process, analysis of existing disease management strategies in food fish and ornamental fish systems.

LP 31113 (3: 30/30) Principles of Aquatic Bio-resource Management

Theory Introduction to aquatic bio-resources; fish and water as aquatic bio-resources, influence of freshwater and marine ecology for aquatic production, problems of improper management of aquatic bio-resources, need of sustainable management for aquatic bio-resources in Sri Lanka, management tools for aquaculture; regulations, effluent and by-product management, stock health management, management tools for fisheries; regulations, stock assessments, catch and effort controls, existing endogenous fisheries management systems and methods, characterizing the effects of utilizing those tools for effective fisheries management, top-bottom management, community based management and co-management, Existing aquatic resources management systems and tools for sustainability; characteristics of sustainable fisheries and aquaculture systems, water quality management for sustainable aquaculture, evaluating existing fisheries and aquaculture management systems for sustainability; evaluating existing fisheries and aquaculture management systems for sustainability, case study for evaluating an example from a selected area.

Practical In situ examination of improperly managed aquatic bio-resources in Sri Lanka, in situ examination of catch and effort control, in situ examination of existing aquatic-bioresource management tools, in situ examination of existing endogenous fisheries management systems and methods, case study for evaluating an example from a selected area, measurements and maintenance of water quality for aquaculture.

LP 32032 (2: 15/30) Applications of Aquatic Bio-resource Management

Theory Fish stock depletions; lessons from the past; international stock depletion case studies 1-5, stock assessment data from the recent past and measures taken to avoid stock depletions, local case studies about stock depletions and counter-measures, Failures and success stories; coastal zone management, lagoon and mangrove ecosystems management, freshwater ecosystem management, effluent management and pollution control, biodiversity conservation in aquatic ecosystems alien species introductions, aquatic bio resource management models for given situations; high input models Vs low input models, open access Vs restricted access models, uncontrolled harvesting systems Vs quota systems, external forces on sustainable aquatic resources utilization model, role of economics in aquatic bio resource management; role of economics in aquatic bio resource management.

Practical Model studies of fish stock assessment and simulations, developing aquatic bio resource management models for given situations.

LP 32082 (2: 15/30) Risk Assessment and Food Safety Management in Fishery Product

Theory Food-borne illnesses / hazards related to fishery products; physical hazards, allergens and other chemical hazards, microbial hazards, common characteristics of food-borne illnesses from fishery products, Risk assessment; risk assessment

process, hazard identification, hazard characterization, exposure assessment, risk characterization, quantitative and qualitative risk assessments, risk management, risk communication, case studies on risk assessments in fishery products around the globe; case studies on risk assessments in fishery products around the globe, Selecting a suitable safety management system for a fishery product; minimizing food-borne illnesses in fishery products, food safety as a global concern and relevance of fishery products to food borne illnesses, global food safety initiatives in fishery products, SLS, ISO, BRC, MSC, IFS in fishery products, integrated food safety management approaches in fishery products.

Practical Examples of quantitative and qualitative risk assessments in fishery products, case studies on different food safety management systems and their suitability for fishery products.

LP 32103 (3: 30/30) Fishery Product Technology

Theory Muscle composition of fish species; muscle composition of finfish species, crustaceans and mollusc muscles, Pre-harvest and post harvest factors affecting fish quality; intrinsic, extrinsic and implicit parameters affecting fish quality, pre and post harvest factors affecting fish quality, post-harvest changes of fish; rigor-mortis, autolytic changes, microbial changes, rancidity, physical changes, Evaluating fish quality; identifying and judging fish quality (organoleptic and quality indexing), quality parameters and standards for export oriented fish processing (microbiological, physical and chemical parameters), quality parameters and standards for local market-bound fish processing (microbiological, physical and chemical parameters), fish processing techniques and technology, and their applications in the industry; chilling, freezing, map, canning, curing and marinating, fermentation, drying, traditional fish processing and preservation methods, recent advances in fishery product technology, case studies in shrimp processing, crab and lobster processing, tuna processing canning.

Practical Determination of fish quality from retail samples, laboratory analysis of fish quality (chemical and microbial), processing technology (tuna, swordfish and other finfish, shrimps, lobsters, crabs and mussels), traditional fish preservation methods, recent advances in fishery product technology.

LP 32113 (3: 30/30) Recent Advances in Biotechnology and Molecular Biology in Aquaculture

Theory Recent advances in aquatic resource biotechnology; hormonal manipulations in aquatic resource technology in growth and development, reproduction, selective breeding, sex determination and sex reversal, genetic improvements and breeding, biotechnology in fish feed production and improvements, effluent treatments and by-product utilization, biotechnology in food safety management, advanced analytical tools in biotechnology towards aquatic resource technology, novel applications, recent advances in molecular biological applications in aquatic resources; gene technology and transgenics in aquaculture production and research, molecular biology in fish breeding, molecular biology in fish disease diagnostics and management safety of fishery products and molecular biology, novel applications.

Practical Hormonal applications in fish breeding and sex reversal (ornamental and food fish species) effluent treatments and by-product utilization- off campus field visit food safety management, molecular biology in food safety management molecular biology in disease diagnostics and management.

LP 32123 (3: 30/30) Technology of Fish Species Production

Theory Production aspects of freshwater finfish culture; feeds and nutrition, juveniles and grower culture, special culture requirements, species of interest; one major species among Indian carps, Chinese caps, Common carp, Catfish and Tilapia underutilized fish species (endogenous and endemic fish species), production aspects brackish water and marine finfish culture; feeds and nutrition, juveniles and grower culture, special culture requirements, species of interest; one major species among milkfish, barramundi, sea bass, sea bream, tuna and other commercial species underutilized fish species (endogenous and endemic fish species), production aspects freshwater, brackish water and marine shell-fish culture; feeds and nutrition, juveniles and grower culture, special culture requirements, Species of interest; one major species among mussels, oysters, cockles and other mollusks, one major species among shrimps, prawns, crabs, lobsters and other species.

Practical One major species among Indian carps, Chinese caps, Common carp, Catfish and Tilapia production aspects of endemic and endogenous freshwater fish, production aspects of one major species among milkfish, barramundi, sea bass, sea bream, tuna and other commercial species production aspects of underutilized fish species (endogenous and endemic fish species), production aspects of one major species among mussels, oysters, cockles and other mollusks production aspects of one major species among shrimps, prawns, crabs and lobsters.

LP 32012 (2:15/30) Animal Biotechnology

Theory Introduction; introduction to the animal cell culture laboratory, sterilization, basic equipments, hazards and safety, history, limitations, opportunitiesand challenges; historical perspectives, contemporary and future of biotechnology, list down major techniques and their principles, biotechnology laboratory set-up, introduction; organism and cell, basics in animal cell culture; media preparation, role of important components of culture media, troubleshooting cell culture, applications in mammals; advances in cell culture, products obtained from animal cells, opportunities and challengers, introduction; what is synthetic biology, recent advances in synthetic biology, opportunities and challengers, applications of synthetic biology, introduction; history and opportunities and challengers, what is recombinant technology, principles of DNA technology; major steps involved in the technology, rDNA, applications of RNA technology; uses and importance, model organisms in biotechnology; what are the model organisms, significance of model organism, introduction; development in livestock genomics, types of molecular markers, classification of molecular markers, applications of molecular markers; research and disease screening, novel applications, introduction; biotechnological utilization of male and female reproductive potential, theoretical basis of ovarian biotechnology; preparation of media and stock solutions,

collection of ovariesand recovery of oocytes, oocyte selection, oocyte-cumulus cell interactions, parthenogenetic activation of oocytes, IVM of oocytes, assessment of cumulus expansion, factors affecting IVM of oocytes, theoretical basis of sperm biotechnology; processing semen, sperm treatment and capacitation, IVF, embryo development, cryopreservation, social concerns; if the blending of animaland human DNA results, intentionally or not, in chimeric entities possessing degrees of intelligence or sentience never before seen in nonhuman animals, should these entities be given rights and special protections?, what, if any, social and legal controls or reviews should be placed on such research?, what unintended personal, social and cultural consequences could result?, who will have access to these technologies and how will scarce resources such as medical advances and novel treatments be allocated? what, if any, health risks are associated with transgenics and genetically modified foods?, are there long-term effects on the environment, when transgenic or genetically modified organized are released in the field?, should research be limited and, if so, how should the limits be decided?, how should the limits be enforced nationally and internationally?, are there fundamental issues with creating new species?, are species boundaries or should they be viewed as a continuum? what, if any, consequences are there of blurring species boundaries?, are chimeras and transgenics more likely to suffer than traditional organisms?, will transgenic interventions in humans create physical or behavioral traits that may or may not be readily distinguished from what is usually perceived to be human?, what, if any, research in genetic engineering should be considered morally impermissible and banned (e.g., research undertaken for purely offensive military purposes)?, will these interventions redefine what it means to be normal?

LP 32022 (2: 15/30) Animal Breeding

Theory Domestic animals and zootechnical systematic; domestication, the wild ancestors of domestic animals, changes caused by domestication zoo technical systematic breeds, lines, supra breeds etc, conformation-preliminary information; standard nomenclature of external conformation in domestic animals conformation standards, the constitution, methods of estimating and describing conformation, zoometrical measurements; measuring procedure, animal identification, growth and development of farm animals; definition, prenatal growth and development, postnatal growth, estimation of the variation of growth and development, genetic principles in animal breeding; heritability, repeatability and methods of estimation of heritability and repeatability; phenotypic genetic and environmental correlations variation, source, relationship; pedigrees, the measure of relationship, inbreeding, coefficient of inbreeding, principles of production recordings, practical animal breeding, breeding value; estimation of breeding value on own performance, estimation of breeding value on performance of ancestors, collateral relatives, progeny test, selection; herd remount, selection differential, genetic gain, selection intensity, selection limits selection criteria, individual selection, mass selection, selection methods-tendem selection, independent culling, index selection etc, livestock improvement; breeding methods: inbreeding, objectives of inbreeding, inbreeding in groups out breeding and crossbreeding, heterosis and hybrid vigour upgrading, rotational crossbreeding, alternate crossing, cross breeding for production, livestock improvement; breeding methods: inbreeding,

objectives of inbreeding, inbreeding in groups out breeding and crossbreeding, heterosis and hybrid vigour upgrading, rotational crossbreeding, alternate crossing, cross breeding for production, livestock breeding in Sri Lanka; role of animal breeding in livestock production opportunities for breeding and improvement of farm animals in Sri Lanka, constraints in improving the productivity of livestock under traditional breeding, new technologies in animal breeding; production of transgenic livestock, modification of production traits.

Practical Preparation a breeding plan for livestock, estimation of coefficient of breeding parameters, prepare a plan for a formation of new breed, practical animal breeding, breeding value; estimation of breeding value on own performance, estimation of breeding value on performance of ancestors, collateral relatives, progeny test.

LP 32042 (2: 15/30) Applied Animal Nutrition

Theory Introduction to applied animal nutrition; introduction to applied animal nutrition, present status of the animal feed industry in Sri Lanka, feeding of ruminants and non-ruminants; feeding standards of ruminants and non-ruminants, nutrient requirements of farm animals; nutrient requirements for maintenance, growth, production and reproduction, regulation of feed intake; regulation of feed intake, physiological regulation, metabolic regulation and thermostatic regulation, factors affecting on feed intake, effect of animal factors on feed intake, influence of management activities on feed intake, effect of forage quality on feed intake and influence of environmental factors on feed intake, nutritional disorders; nutritional disorders such as milk fever, ketosis, bloat, grass tetany and displaced abomasum, agro-industrial by products; utilization of agro-industrial by products and non-conventional feedstuffs, types of agro-industrial by-products, plant by-products, cereals, pulses, plantation, fruit by-products, animal by-products, waste products, non-conventional feedstuffs etc. feeding of agricultural by-products and economic significance of agro-industrial by products as alternate feed resources, Feed manipulation and upgrading; feed manipulation and upgrading, importance of feed manipulation and upgrading, method of feedstuff upgrading, physical treatment, thermal treatment, chemical treatment, biological treatment, supplementation and genetic manipulation, impact of upgrading on nutritive quality, Ration formulation and ration manufacturing; ration formulation and ration manufacturing, importance of ration formulation, important facts on feed formulations, types and features of rations, methods of ration formulation, methods of ration manufacturing, constraints in ration formulation, feed laws; feed laws, rules and regulations, feed registration, labeling, and government inspection, feed tag label requirements, impact of animal nutrition on the environment.

Practical Feed processing and upgrading techniques, application of physical treatments, application of chemical treatments, application of biological treatments, ration formulation and ration manufacturing, recipe calculation and ingredients selection for a broiler or layer ration, practice of hand mixing. detection of the quality, preparation of feed supplement, preparation molasses urea mineral block, feeding trials for farm animals, visit to feed processing and manufacturing factories- observation of feed ingredient quality determination, observation of feed

processing and handling techniques., observation of manufacturing various feeds, observation of feed quality determination, observation of maintenance of a safer factory environment, observation of utilities and services, observation of factory layout and the establishment of equipment and other units.

LP 32092 (2: 15/30) Zoonoses and Public Health

Theory Emerging zoonotic diseases; the teaching strategy for this course will be based primarily on student seminars, in which each student will be assigned a specific geographical region, from which he/she will describe the 2 most important emerging zoonotic diseases in a 30-minutes presentation. each week, one geographical region will be discussed. students will briefly describe the epidemiological data (distribution, prevalence, incidence, outbreaks, morbidity, mortality, etc) and major epidemiological differences of such diseases, highlighting differences as well as potential risks for the Sri Lanka. other participants will bring at least one peer reviewed paper related to a ZD of public health significance from the particular geographical area under discussion, and will share their findings from the selected paper in an open dialogue. In addition, each student (except the student presenting) will turn in an outlined summary of the article, highlighting the public health significance, and why the article was chosen. supplemental assigned readings will be used to expand the information in a specific pertinent topic. Public health concerns in zoonotic diseases; the teaching strategy for this course will be based primarily on student seminars, in which each student will be assigned a specific geographical region, from which he/she will describe the 2 most important emerging zoonotic diseases in a 30-minutes presentation. each week, one geographical region will be discussed. Students will briefly describe the epidemiological data (distribution, prevalence, incidence, outbreaks, morbidity, mortality, etc) and major epidemiological differences of such diseases, highlighting differences as well as potential risks for the Sri Lanka. other participants will bring at least one peer reviewed paper related to a ZD of public health significance from the particular geographical area under discussion, and will share their findings from the selected paper in an open dialogue. in addition, each student (except the student presenting) will turn in an outlined summary of the article, highlighting the public health significance, and why the article was chosen. supplemental assigned readings will be used to expand the information in a specific pertinent topic. introduction; definitions for zoonosis, public health, occupational health. strategies adapted for prevent or minimize zoonosis spread, common zoonotic diseases; common zoonotic conditions and clinical signs and diagnosis, health and safety; education and frequent screening and treatment methods, introduction; definitions for prevention and control methods, Strategies, monitoring and record keeping strategies, monitoring and record keeping; mode of application of preventive and control strategies in important diseases, farm sanitation and cleanliness, biosecurity, probiotics, prebiotics, stress control, vaccination, genetics and breeding, water, routing management practices, evaluation and screening; methods of reporting, monitoring and assessment of strategies adapted, introduction; definitions for disease outbreak, epidemic, endemic, pandemic, contagious, infectious and examples for each situation, economic and social impact, national and international law; animal disease act in Sri Lanka, OIE regulations, reporting and screening

authority; local and international agencies dealing with animal health regulation and disease control.

Practical Case study: 1, Case study: 2

LP 41072 (2: 15/30) Fish Breeding and Larviculture

Theory Introduction to fish seed production; need of fish seed production, application of fish seed production in commercial and conservatory aquaculture, existing seed production methods, their advantages and limitations, comparative requirements of fish broodstock (freshwater finfish, marine finfish and crustaceans); requirements of broodstock in freshwater finfish, marine finfish, crustaceans (shrimp and prawn) and molluscs, Broodstock rearing of fish species (using examples of freshwater finfish, marine finfish, crustaceans (shrimp and prawn) and molluscs; broodstock rearing of freshwater finfish, marine finfish, crustaceans (shrimp and prawn) and molluscs, natural breeding methods; Artificial breeding methods; recent advances in fish breeding, Requirements, essential components and designing for finfish and crustacean (shrimp and prawn) hatcheries; site selection for a fish hatchery, construction, maintenance and management of fish hatcheries, Requirements for broodstock and fish seed transport; Conditioning and transport protocols; Basic concepts of record keeping and economics in fish hatchery.

Practical Commercial applications of fish seed production, conservatory applications of fish seed production, estimate broodstock and larval requirements of freshwater finfish, marine finfish, crustaceans (shrimp and prawn) and molluscs, site visits for a freshwater finfish, marine finfish, crustacean (shrimp and prawn) hatchery, broodstock and fish seed conditioning, packaging and transport.

LP 41103 (3: 30/30) Ornamental Fish Culture

Theory Introduction to ornamental fish industry; ornamental fish industry in the world and in Sri Lanka, characteristics of small and large scale ornamental fish farming, past, present and future trends of the industry, potentials in Sri Lanka, industry swot for Sri Lanka and given local places, problems and limitations for expansion, types and techniques of ornamental fish culture; marine and freshwater, indoor and outdoor, tropical and temperate, small and large-scale fish culture systems, planning, construction and maintenance of glass, concrete and other aquaria, indoor and outdoor ponds; production planning; importance of production plan as a tool in ornamental farm management, factors of consideration for production planning, production planning for livebearers, production planning for egg layers, types of ornamental fish, their breeds and maintenance; types of ornamental fish, their breeds and characteristics, broodstock management, breeding, hatchery management and larval rearing, nutrition and feeding, special feed formulations and live feed production technology, water quality testing and management, ornamental fish disease identification and management, fish conditioning, packaging and transport, cost-benefit analysis, case study, recent advances in ornamental fish industry, freshwater endemic fish species in Sri Lanka; identification and the status of freshwater endemic fish species in Sri Lanka, culture techniques of common

endemic species, breeding techniques for endemic species, stock enhancement and conservation of freshwater endemic fish species, ornamental aquatic plants; uses, types and examples, culture techniques and tissue culture; introduction to ornamental aquatic plants, uses, advantages and limitations of ornamental aquatic plants, types of ornamental aquatic plants and their uses, common culture methods for ornamental aquatic plants recent advances in ornamental aquatic plants culture, aquascaping.

Practical Situation analysis of small scale and large scale ornamental fish farms, role play for starting up a new Orna-fish farm, field tours on small scale and large scale ornamental fish farms for types and techniques of ornamental fish culture, construction of glass aquaria and concrete tanks and their maintenance, production planning for fish types (egg layers and live bearers), ornamental fish varieties and their requirements, water quality testing and management, nutrition, feeds and feeding, broodstock management, breeding and larval rearing of ornamental fish, fish conditioning, packaging and transport, general management and breeding of freshwater endemic fish in Sri Lanka, identification and culturing of ornamental aquatic plants.

LP 41122 (2: 30/00) Proposal Formulation and Scientific Writing

Theory General statement of the problem to be investigated; to establish your area of interest, Justification of the study; to explain why the problem is worth studying, a specific statement of the problem; to clarify the question you are trying to answer, definition of key terms/constructs used; to avoid to any ambiguity of reference, Statement of the overall purpose of the research; to make clear what will be achieved as a result of the study, critical analysis of the relevant literature; set out the main issues arising from the literature, comment on any conflicting findings, demonstrate the gap in knowledge which the researcher hopes to fill, an explicit statement of the research questions/hypotheses; to let the leader know exactly what variables and relationships you will be investigating, an outline of the approach to be used and procedures to be followed; describe the explain how data will be used and procedures to be followed, show that the approach chosen is appropriate to the problem, explain the theoretical framework to be used and the reason for the choice, explain how the sample/subjects will be selected and why, a report on any pilot study conducted; to support your choice of methodology, an ethics approval form; to demonstrate an awareness of the responsibility to the subjects, a detailed time table; to show that the research can be completed in the time allowed, a detailed time table; to show that the research can be completed in the time allowed, a list of all sources referred to in the proposal.

LP 41012 (2:15/30) Animal Behavior and Welfare

Theory Introduction to animal behavior; definitions and concepts of animal behavior, introduction to animal welfare; definitions and concepts of animal welfare, introduction to five freedoms, evolution and behavioural genetics; variation, heritability,selection, optimality and efficiency, domestication, motivation and regulation of behavior; factors affect on motivation, motivational state, motivation

concept, monitoring motivation, motivation and other behaviour control system, locomotion and gaits; walk, trot, canter and gallop, jump, distance travel, need for exercise, learning and cognition; predisposition to learn, habituation and sensitization, experimental learning studies, specific aspects of behavours; feeding behaviour, territoriality and spacing, parental behaviour, social behaviour, reproduction behavior, exploration, abnormal behaviours, behaviour towards predators, rest and sleep, juvenile and play behavior, introduction to studying behavior; preliminary observations, describing behavior, types of measures, event and state, different level of measurements, recording methods; sampling rules, recording rules, continuous recording, instantaneous sampling, one-zero, sampling, sample interval, analyzing specific aspects of behavior; bout length, analyzing sequence and rhythm, choice test, animal welfare assessment; introduction to measures of welfare, physiological measures, behavioural measures, animal pain, distress and suffering; concepts of pain, distress and suffering and it's relation to animal welfare, measures of pain, major issues related to farm animal welfare; housing, handling, transportation, slaughtering, diseases and injuries, human animal interaction; concept of human animal relationship and its assessment, effect of stockperson on animal welfare and productivity, development of human animal relationship, welfare of laboratory, zoo and domestic animals; introduction to 3R concept, handling techniques of laboratory animals, demonstrations of anesthesia, analgesia and euthanasia (rabbits, gunia pigs, rats, poultry), welfare issues of zoo and domestic animals, legislations in animal welfare; welfare code systems for different farm animals, ethical issues of use of animals in experiments.

Practical Welfare assessment of animal, problem analysis, farm practices, food production.

LP 41032 (2:15/30) Biodiversity Management

Theory Introduction to biodiversity; levels of biodiversity, alpha beta and gamma diversity, bio diversity of Sri Lanka, assessment and monitoring of biodiversity; field data recording techniques, plant identification, preparation of herbarium specimens, floral sampling methods (quadrates, plot less transects), faunal identification, visual encounter surveys, monitoring of animal populations; (sampling and basic statistical methods, relative and absolute abundance, census and estimates, survey designs), animal population census (total counts territory mapping) and survey technique (indices of abundance transects, point counts) species area curves, detection probability, distance sampling, mark and recapture and removal techniques, indirect sampling methods, studying animal behavior, introduction to biodiversity conservation; values of biodiversity, loss of biodiversity, insitu and exsitu conservation, protected area network in Sri Lanka, global and national conservation initiatives, historical development of forest and wildlife conservation in Sri Lanka, policy aspects; fauna and flora protection ordinance, forest ordinance, forestry master plan national biodiversity, conservation action plan, multinational environmental agreements (CB, RAMSAR, CITES and CMS), principles and approaches of " conservation biology".

Practical Assessment of biodiversity and its conservation in Sri Lanka.

LP 41042 (2:15/30) Cereal Science and Technology

Theory Wheat production processing and utilization; origin and production, wheat tradeand consumption, classification and grading, wheat processing, rice production processing and utilization; origin and production, rice type and their determination, rice milling, rice quality and grading standard, rice parboiling, utilization of rice as food and feed, production, processing and utilization of corn; origin and production, types and composition, quality and grading standard, utilization as food and feed, corn milling, Production, processing and utilization of sorghum; origin and production, composition, industrial utilization of sorghum, processing for livestock feed, cereal carbohydrate; properties of starch and non-starch polysaccharides, cereal proteins; composition and properties of proteins, cereal lipids; free and bound lipids. non starch lipids, free fatty acids composition, nonsaponifiable lipids, lipids in structural parts, Minor constituents; vitamins, minerals, enzymes, pigments, nutritional related components, breads and yeast-leavened bakery products; bread- baking industry trend, dough processing, production steps of bread, bread quality parameters, processing of other yeast-leavned products (bun rolls, noodles)andtheir quality parameters, cereal based snaked products; cookies and biscuits, extruded snacks and other cereal snacks, malted cereals their production and uses; malting process, the brewing process, baking applications, malts in distilled sprits, Health beneficial compounds in cereals; health beneficial phytochemicals in cereal, cereal resistant starch.

Practical Determination of rice grain quality, determination of rice carbohydrates, proteins and lipids from diverse varieties grown in Sri Lanka, processing and quality evaluation of bread, bun and noodles and a filed visit to IPTS Anuradhapura, determination of antioxidant capacity of different varieties, estimation of resistant starch content of rice.

LP 41052 (2:15/30) Cleaner Production

Theory Introduction; define cleaner production, resource depletion and global environmental issues, introduction to cleaner production assessment, cleaner production process flow diagrams; quantification of resource flows; data collection, in-situ measurements, material balance, costing of resource flows; costing of inputs (initial investment, processing cost, raw materials), costing of waste, waste causes analysis, costing, generation of CP options based on waste causes and CP techniques develop CP options and feasibility analysis; feasibility analysis, technical feasibility, financial feasibility, environmental feasibility, CP techniques; input substitution, good housekeeping, better control process, product modification, equipment modification, technology change, on site recover/reuse, development of useful by-products, CP techniques; input substitution, good housekeeping, better control process, product modification, equipment modification, technology change, on site recover/reuse, development of useful by-products, implementation and sustaining of CP and other concepts for achievement of sustainable development.

Practical Assessment of applications of cleaner production in Sri Lanka.

LP 41062 (2:15/30) Extractive and Sustainable Aquaculture

Theory General aspects of resource degradation in aquaculture; reasons for resource degradation by aquaculture, environmental problems in aquaculture and mitigatory measures; environmental problems in aquaculture, their mitigation, concepts and detailed analysis of fish integration;, suitability and the role of fish as a component in integration systems, fish integration systems with terrestrial farming; crop and fish integration systems, livestock and fish integration systems, livestock-crop-fish integration systems, fish as a component in agro and ecotourism, fish integration systems in marine systems; integrated multi-trophic aquaculture (IMTA) and multi-species aquaculture, extractive aquaculture.

Practical Environmental problems in aquaculture and their mitigation, terrestrial systems with fish integration, fish in agro and ecotourism.

LP 41093 (3:15/60) Laboratory Techniques in Livestock Production

Theory Identifying Laboratory techniques used in livestock production, discuss the laboratory hazards, safety measures and first aid procedures; types of laboratories, orientation to the laboratory and rules of conduct, general laboratory techniques used in the livestock production, laboratory hazards, Introduction to laboratory safety and its importance; laboratory safety and importance of safety measures, occupational hazards, general laboratory procedures and safety rules; laboratory policies and procedures, laboratory safety, emergency response, personal and general laboratory safety, safety inspection of labs, safety measures and first aid; safety measures, safety equipment, emergency equipment, emergency response plan, first aid methods, responsibilities of laboratory personnels; responsibilities of laboratory supervisor, responsibilities of laboratory technician, responsibilities of laboratory attendance, responsibilities of administrative officers, types of waste generated in a laboratory; identifying hazardous wastes, methods of waste management; planning for pollution prevention, facility management, waste reduction, waste disposal, reuse of laboratory wastes, recycling of laboratory waste, Introduction to basic laboratory techniques in LP; perform routine laboratory math calculations, identification of types of glass ware and common chemicals, preparation of solutions, maintain and control of stocks, Introduction to equipment used in LP; introduction to the principles of commonly used laboratory equipment (eg. microscope, spectrophotometer, centrifuge, autoclave, lamina flow etc) and their proper use basic care and maintenance procedures of laboratory instruments, perform standard calibrations of equipment (thermometers, micro pipette, analytical balance, ph meter, refractometer etc), basic laboratory skills including pipetting, microscope use, autoclaving etc, fundamentals of phlebotomy; defining phlebotomy, devices for phlebotomy, universal precautions and biosafety techniques in phlebotomy, applied phlebotomy and sample (clinical sample and non clinical sample) collection; types of samples to be collected in a livestock laboratory, sampling sites and sampling procedures, phlebotomy andcollection of other samples, sample labelling, storage and transportation to the laboratory, heamatolog; introduction to hematology, components of blood, blood collection, anticoagulants, preparation of blood smears, staining of blood smears,

hemocytometry, differential leucocyte count, reticulocyte count, hemoglobin, packed cell volume, red cell indices, erythrocyte sedimentation rate, bone marrow smear examination, red cell morphology study, anemia, hemostasis, automation in hematology, immunological techniques; characteristics and functions of the components of the immune system, antigen/antibody reactions, principles of various testing systems used for immunological procedures (eg. ELISA, immune histochemestry etc) and correlate immunological tests results to diagnostic significance, chemical pathology; liver function tests and kidney function tests, investigation of some components such as glucose, proteins, cholesterol in blood sample, fecal investigation; physical investigation of fecal sample, qualitative and quantitative investigation of fecal sample, microbiological investigation of fecal sample, correlate the laboratory findings with clinical significance, Urine investigation; introduction to structure and function of the urinary tract, identify, analyze, and report, physical and chemical properties and constituents in urine, explain abnormal findings in urine and correlate these with diseases or disorders, histopathology; sectioning of tissues, staining of tissues, identification of normal and abnormal cell types interpretation of findings, Cell culture; types of cell lines, growth of cells, advances of cell culture techniques, significance of cell culture, Isolation and identification of bacteria; general introduction to important microbes in LP, microbial growth and nutrition, sterilization, disinfection and antisepsis, culturing techniques of microbes, enumeration of microbes, isolation of microbes (gram positive and gram negative) from various samples (clinical, food, meat, egg and fish),identification of microbes based on phenotypic and biochemical characteristics, determination of bacterial growth curve, mechanism of action of antimicrobial agents, antibiotic sensitivity test and water quality testing, analysis of quality of feed, meat and dairy products; analysis of microbiological quality, Basic molecular tools in LP; nucleic acid extraction and its principles, rapid identification techniques of microbes (eg. polymerase chain reaction) in lp, detecting diversity of microbes, quantification of microbial genes, basic principles of gene cloning, Introduction to bioinformatics; accessing nucleotide sequences, use of bioinformatics tools such as blast, clustalw, multi alignment, designing primers and nucleotide sequence analysis, post mortem examination; importance of post mortem examination, factors to be considered in post mortem examination, post mortem examination of large animal (cattle), post mortem examination of poultry, correlate findings with clinical case.

Practical Preparation of material safety data sheet (MSDS) to be used in a laboratory, preparation of first aid kit, demonstration of first aid methods, participate in laboratory workplace safety, demonstrate laboratory safety precautions concerning laboratory procedures, collection of waste to proper collectors and handing of waste in proper way, preparing a laboratory hazardous waste management guide, designing a waste treatment plant, handling of instrument such as microscope, preparation of solutions, calibration of instrument, sampling of urine, blood, fecal matter, food, water, milk, meat, fish and egg, blood sample collection, Preparation of blood smears, staining of blood smears, differential cell count, erythrocytes count, leucocyte counts, reticulocyte count, measuring, haemoglobin concentration, packed cell volume, erythrocyte sedimentation rate, red cell morphology, calculation of red cell indices, interpretation of results with case

studies, liver function tests, Kidney function tests, fecal analysis, urine analysis, histopathological, investigation, identifying cell culture techniques, isolation of identification of bacteria in a given sample, determination of growth curve of isolated bacteria, enumeration of bacteria in a given sample, antibiotic sensitivity testing, water quality testing, nucleic acid extraction, performing PCR and identifying specific organism, designing primers, use of bioinformatics tools, postmortem examination of large animal (cattle), postmortem examination of poultry, correlate findings with clinical case.

LP 41113 (3:30/30) Processing and Utilization of Animal Byproducts

Theory Introduction; definitions of animal byproduct, history of processing animal by products by- product categories, present status of animal byproducts in local and global level, rendering industry; products of rendering, uses of rendered materials, rendering systems, impact of rendering systems on product quality, comparison of rendering methods, processing of animal byproducts; processing of blood and utilization- introduction to blood and blood collection techniques, general properties of blood fraction in food, blood serum for laboratory use, processing of blood meal, blood albumin, red blood cell paste, spray dried blood and their utilization, feeding of whole blood, processing of organ meat and offal- processing of liver, heart, tongue, kidney, brains, oxtails, meat extracts and trimmings, pork jowl, pig tail, skin and feet, testicles, spleen, poultry giblets, use of intestines, bladder and stomach as sausage casingsand other products, processing of hide -introduction to trade in hide and leather, hide composition, hide fleshing, curing, trimming, sorting, tanning, deliming, bating, tanning, dying, fatliquoring, drying, finishing, properties of leather, by products in poultry industry-feather meal, poultry by product meal, day old chick meal, ensiled poultry manure, by products of poultry eggs, hatchery waste, poultry grease and oil, sea food byproducts- fish meal, fish silage, fish oil and fish protein concentrates, cannery waste, oyster shell, by products in dairy industry, other potential products; pet feed, pharmaceuticals, enzymes and hormones, bone meal, lard and tallow, gelatin, environmental impact and global legislations of the animal byproduct industry; animal processing waste disposal and treatments, introduction to legislations in animal by product industry.

Practical Evaluation of the nutritive value of animal by products, processing of blood, organ meat, offal, wool, hair, hide and feather, production of lard and tallow.

LP 41132 (2:15/30) Recent Advances in Animal Bio-resource Production

Theory Introduction; define terminology and historical and contemporary perspective of bioresource production and technology, cellular and molecular basis of life; basic concepts in protein, nucleic acids and animal body, developmental biology and phenomic gap; biology, endocrinology and evolution in farm animals, introduction; define terms of genes, genome, genomics, proteomics, xenotransplantation and gene therapy, genomis; human and porcine genome study and impact of bioresource production. DNA in bioresource production, proteomics; proteomics and their role in advancement of bioresource production, transcriptome; concepts, RAN

in bioresource production, Gene therapy concepts; concepts and prospects, novel applications, Introduction; human animal interphase studies, one health concept, evolution of abatement and mitigation strategies, Applications in bioresource production an overview; health and medicine, veterinary medicine and biomedical science andagriculture, food and feed, environment, energy, pharmaceuticals, forensic studies, animal waste, methane emission and mitigation, transgenic animals: generation of profoundly genetically modified organisms. sleeping beauty transposon system, cre-loxp-mediated cassette exchange, transgenic animals are ready to become industrial bioreactors for the preparation of pharmaceuticals in milk and probably in the future in egg white, gene knockout and knockdown strategies, transgenic production, xenotransplantation: concepts and prospects, Sri Lankan context and chronic, kidney disease of uncertain etiology (CKDu), Mesoamerican context and chronic kidney disease of nontraditional etiology (CKDnt), introduction; treads in isolation and identification of cells from various origins, the vaccine development and immunology, isolation of mammalian cells and manipulation; oocyte and ovary modal for VEGFA testing for biomedical research and farm animal production, cystic ovary of high producing cows, PCOS in human. cell culture, tissue culture and organ culture, vaccine development; immunology and contemporary issues, emerging technologies- pure recombinant or synthetic antigens used in modern day vaccines, vaccine adjuvants, methane emission; major sources of atmospheric methane, environmental and health related issues due to methane, mitigation strategies, introduction; present status in application of bioresource production both in the animals and human-animal interphase, animal waste and farm waste management; identify sources, reactions, consequences of methane emission, mitigation and abatement, introduction; ethics and contemporary biology and biotechnology, guidelines; animal subjects: laboratory animals, farm animals, human subjects in biomedical use, social aspects in ethics; zero animal research?, artificial modal animals, membrane biology.

LP 42012 (2:00/200*) Industrial Training

Intended Learning Outcomes

- display attributes, skills, behavior, and attitudes require at a work place.
- apply appropriate scientific principles and techniques in a dynamic working environment.
- demonstrate the ability to establish effective relationships with others, and to define, share and delegate responsibilities.
- display skills of professional scholarships required for personal development and career management

LP 42026 (6:00/600*) Research Project

- exhibit scientific writing ability.
- analyze the data using appropriate techniques.
- discuss and interpret the results and draw conclusions from the study carried out.
- draw policy implications based on the results of the study.

* *Notional Hours*

Information and Communication Technology

Information and Communication Technology

Information and Communication Technology

Courses of Information and Communication Technology (ICT)

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year I Semester I	AG 11040	Computer Systems and Application	(0:15/30)	Compulsory
Year I Semester II	AG 12030	End User Applications	(0:15/30)	Compulsory
Year II Semester I	AG 21030	Database Systems and Visual Programming	(0:15/30)	Compulsory
Year II Semester II	AG 22030	Web Design and Graphic Animation	(0:15/30)	Compulsory
Year III Semester I	AG 31020	Statistical Application I	(0:15/24)	Compulsory
Year III Semester II	AG 32010	Statistical Application II	(0:15/24)	Compulsory

8. INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

8.1 Course Capsules of Information and Communication Technology

AG 11040 (0:15/30) Computer Systems and Application

Theory Introduction to computer, Classification of computers, Introduction to operating system, DOS Commands, Windows, Introduction to Number systems and logic gates, Computer Networking, Word Processing, Electronic Presentations

Practical's Word processing software, Presentation software

AG12030 (0:15/30) End User Applications

Theory Introduction to database Concept and Technology, Creating Tables, Working with Entities, Designing Queries, Querying records from entity, Creating and Using Forms with Wizard, Customizing Forms in Design View, Graphic Design Applications Navigating the Workspace Creating and Using Reports, Navigating the Workspace, Windows and Controls, Working with Documents, Windows and Controls, Data Management with Spread Sheets, Function Categories

Practical's Microsoft access, Adobe photo shop, Spread sheet Software

AG 21030 (0:15/30) Database Systems and Visual Programming

Theory Introduction to Databases, Relational Algebra SQL, Data Security, Database Project, Visual programming

Practical's My SQL,Ms Access, Visual Basic

AG 22030 (0:15/30) Web Design and Graphic Animation

Theory Introduction to HTML, Basics of web development, Format of HTML documents, Difference between HTML and XHTML, Create links in HTML documents, Add images to HTML documents, Adding audio, and video, Create HTML tables,Create HTML lists, Create forms in HTML, Creating Web pages with frames, Basics of Cascading Style Sheets (CSS) for formatting HTML documents, Basics of Java Scripts, Introduction to Dreamweaver, Introducing the Interface, Creating a website, Adding images &links, Adding audio and video, & Flash™ to a page, Creating sites using templates, Designing with tables,Creating online forms, Saving time with libraries, Assets& More, Creating websites with frames, Designing with Cascading Style Sheets, Rollovers and other image tricks, Templates, Introducing the animation software, Fundamentals, Natural drawing tools, Advance vector drawing, Setting colors, Creating animation

Practicals HTML, Macromedia Dreamweaver, Macromedia Flash

AG 31020 (0:15/24) Statistical Application I

Theory Data processing concepts, Basic functionality of statistical packages, Reading raw data files, Creating data sets, Creating variables, presenting data sets, Combining data sets, Conditional statements, Data formats, dropping and keeping variables, Producing,bar charts, pie charts, charts,plots, histograms, scatter plots, examining data distributions, descriptive statistics, Common error in SAS, Data Files in SAS Libraries

Practicals Using statistical software

AG 32010 (0:15/24) Statistical Application II

Theory Normality test procedures, T-tests, Analysis of Variance, Regression and regression diagnostics, Categorical data analysis, Analysis of Covariance

Practical Using statistical software

Assessment (ICT)

Continuous Assessment:

Could include submission of practical activities during certain selected normal classes and Midterm where activities have to be done.

Assignment:

Activity done during the class hours and off class submitted 50 Marks

Final Exam:

Covering the whole course two hours theory paper end of the semester. 50 Marks

Students must pass Information Communication Technology (ICT) in each semester for completion of the degree

English Language

English Language

English Language

English Language

Courses of English

Year/ Semester	Course Notation, Name, Units and Hours for theory and practical			Compulsory/ Elective
Year I Semester I	AG 11010	English for Academic Purposes - I	(0:60/00)	Compulsory
Year I Semester II	AG 12010	English for Academic Purposes - II	(0:60/00)	Compulsory
Year II Semester I	AG 21010	English for Academic Purposes - III	(0:60/00)	Compulsory
Year II Semester II	AG 22010	English for Academic Purposes - IV	(0:60/00)	Compulsory
Year III Semester I	AG 31010	English for Academic Purposes - V	(0:60/00)	Compulsory
Year III Semester II	AG 32010	English for Academic Purposes - VI	(0:60/00)	Compulsory

9

9. ENGLISH

AG 11010 English for Academic Purposes - I

Unit one Social English, Identifying topic of a text, English is Tough, Learning a new language, 'Be' and 'Have' as full verbs, Jokes, Writing and Reading (Dictocomp), Dictionary Skills, Nobody's Child by Karen Young, Using basic punctuation, Extracting specific information (Scanning),Quotations.

Unit Two Introducing self and others, Conversation, Moon, Simple Present Tense (Active & Passive), Dictocomp, Inferring meaning of words using contextual clues, people on a Rope, Writing a good paragraph, Identifying the topic of a text, I Love You Because by Jim Reeves, How shall we spend the money?, Used Vs Loved.

Unit Three Expressing likes and dislikes, Conversation, Martha's Vineyard, Present Continuous Tense (Active and Passive), Humour, Nouns and Compound Nouns, Dictocomp, Describing a place, Green grass of home by Tom Jones, Determiners (Articles), This is what love is about.

Unit Four Talking about one's family, Learning English, Present Perfect Tense (Active & Passive), Can baldness be cured, Adjectives and Compound Adjectives, Funny interview, Welcome to my world by Jim Reeves, Describing a person, Dictocomp, Matching headlines and news Items, The trial, Team work.

Unit Five Talking about routines, A lecture on study skills, TV or no TV, Simple Past (Active & Passive), Reporting past events (Narrative), Past Continuous Tense, Jokes, Everyday expressions, Sad movies make me cry by Sue Thompson, Night of the scorpion by Nissim Ezekiel, Dictocomp, Making others happy.

AG 12010 English for Academic Purposes - II

Unit One Asking for permission, Requesting a favour, Granting a request, Conversation (Agreeing and disagreeing), Colour in animals, Past Perfect Tense (Active & Passive Voice), Brilliant ways girls turn down boys, Binomials, (Dictocomp) – Strange advertisement, Note/Message, Country roads by John Denver, Picture description, Heart touching story.

Unit Two Asking for and giving directions, Is there life on outer space?, Getting the gist of a text, Clause elements & Basic sentence patterns, Letter from Bantu Singh of Punjab to Bill Gates of Microsoft, Adverbs, Developing reference skills, Women in Britain, Informal letter, I have a dream by Abba, The brick.

Unit Three Apologising, Conversation, Women's Lib by Kamala Wijeratne, The Imperative, The absent-minded wife, Punctuation, Expressions related to likes, dislikes and desires, Que sera sera by Doris Day, Making the best use of the land, The secret few people guess, True story.

Unit Four Domestic tourism, Burglary, Email Li-Li, Courtship and marriage in different cultures, A wish from a fairy, Prepositions & Dependent Prepositions, My Bonnie lies over the ocean by The Beatles, Types of relationships, Impromptu speech, Ten commandments.

Unit Five New invention, Ambiguous dialogue, Pronouns, Understanding reference words, Married life, Phrasal verbs, Composing an email, Give me a home by John Denver, Club of crime, A Mother's love.

AG 21010 English for Academic Purposes - III

Academic writing

Taking down notes, Making notes and writing down notes, Paraphrasing, Summarizing, Writing descriptions, What is descriptive writing?, Describing locations, places, people and directions, Describing processes and developments.

Academic reading

Understanding meaning, Deducing the meaning of unfamiliar words and word groups, Understanding relations within the sentence/ complex sentences, Understanding explicitly stated information.

Academic speaking/ seminar skills

Participating in the discussion, Interrupting politely, Asking questions Stating a point of view, Controlling the discussion, Chairing a discussion, Changing the subject, Coming to a conclusion.

Academic listening

Understanding sounds, Understanding different languages, Understanding different pronunciation / accent in English, Note taking, Introduction to note taking, Introducing to branching notes, Abbreviations and symbols.

AG 22010 English for Academic Purposes - IV

Academic writing

Developing an argument, Presenting arguments, ideas and opinions, Expressing certainty and doubt, Drawing conclusions, Writing essays, Essay organization: presentation and layout, Writing paragraphs, Writing introductions and conclusions, Editing.

Academic reading

Understanding relationships in the text, Understanding the communicative value of sentences, Understanding relations between the parts of a text through lexical cohesive devices, Understanding text by going outside it.

Academic speaking/ seminar skills

Role playing, Understanding different roles, Understanding different situation, Understanding and using non verbal cues, Participating in debates, Language use in a debate, Presenting ideas, Breaking ideas.

Academic listening

Skimming: listening to obtain gist, Scanning: Listening to obtain specific information, Ignoring irrelevant information, Selective extraction of relevant points, Extracting salient points to summarise a text, Following instructions.

AG 31010 English for Academic Purposes - V

Academic writing

Analytical writing, Expository writing, Persuasive writing, Narrative Writing, Memorandum, Business / official Letter writing.

Academic reading

Understanding important points, Distinguishing the main ideas from supporting details, Recognizing unsupported claims and claims supported by evidence: fact from opinion, Extracting salient points to summarise, Following an argument, Reading critically, evaluating the text.

Academic speaking/ seminar skills

Delivering a speech, The purpose of speaking, Making notes to speak, While delivering a speech, Making a presentation.

Academic listening

Understanding meaning, Recognizing spoken sentences, Understanding intonation, voice emphasis etc, Importance markers, Deducing the meaning of unfamiliar words and word groups.

AG 32010 English for Academic Purposes - VI

Academic writing

Preparing job applications, Bio data, Curriculum Vitae, Covering letter, Organizing and participating meetings, Preparing an agenda, writing minutes.

Academic reading

Reading efficiently, Surveying the text book /manual, Surveying extraction of relevant points, Skimming to get gist / general expression, Scanning to locate specifically required information, Reading quickly.

Academic speaking/ seminar skills

Interview skills, Before the interview, At the interview, Organizing and participating a meeting, Different terms associate with a meeting, Different speeches in a meeting.

Academic listening

Understanding relationships in the lecture/ discussion/ demonstration, Understanding the lecture by going outside it, Evaluating the importance of information, Recognizing the sections of a talk, Distinguishing the main ideas from supporting ideas, Listening critically evaluating the text.

Assessment

Evidence of outcomes is measured by written and verbal presentations and practical tests. Evidence at outcome level can be self-contained assignments, and group assignment integrating all outcomes, possibly with a thematic approach

Method of evaluation

Final mark calculation for each semester will be based on the following:

Continuous Assessment

Total marks allocated: 40%

Classroom assessments

- Reading 10%
- Writing 10%
- Speaking 10%
- Listening 10%

End Semester Examination

Total marks allocated: 60%

Type of Assessment	Time allocated	No. of questions	No. of questions to be answered	Marks allocated %
MCQ				
Essay	03 hours	06	06	60

Students must pass English for Academic Purposes in each semester for completion of the degree

10. EXAMINATION CRITERIA

10.1 GENERAL

10.1.1 A student who satisfies the following conditions will be awarded a BSc Hons degree in Agricultural Sciences and Management

10.1.1.1 Be registered by the university as a candidate for the degree programme.

10.1.1.2 Has completed the programme of studies for each semester to the satisfactory level to the Senate.

10.1.1.3 Has at least 80% attendance for lectures, tutorials practical assignments, field practicals and other academic activities.

10.1.2 Every registered student who wishes to sit for the examinations should submit an application in the appropriate form within the stipulated period. Each eligible student will be issued an admission card/form to sit for the relevant examination.

10.1.3 Every candidate should sit for the examination in respect of all the relevant subjects studied during the semester. A candidate wishing to repeat/upgrade the result of a subject should sit for that subject at the next first available opportunity.

10.1.3 Revision of the Faculty Curriculum will be effected once every five years or as decided by the Faculty Board. Once the curriculum is revised, students who have not completed their required course units under the preceding curriculum will be offered three attempts to complete the required course of study, provided that the eligibility criteria is met.

All the practices, norms and traditions carried-out regularly on examination matters from the inception of the faculty are treated as legal and valid up to today and in future too.

A candidate who fail to complete the whole or any part of the final examinations of any subject/ course will have to repeat the whole subject. Such attempt will be treated as the 1st attempt if a valid medical certificate is submitted within the prescribed time period.

10.1.4 Assessment policy strategies.

Each credited (GPA) course will have an end-semester comprehensive written examination. They will also have continuous assessments as approved by the departments. Each non-credited (non-GPA) course will have continuous assessments designed and evaluated by the coordinator and approved by the Senate. The practical component of courses will be assessed as decided by the departments and approved

by the Senate. The industrial training programme will be assessed by the supervisors appointed by the departments that offer the specialization module.

10.1.5 Examination structure

Structure of the Examination Papers

Credits	Part II	Marks	Part I	Marks
1 or 2	1½ hr 04 out of 05questions 02 compulsory 02 optional	25 x 2 (C) 15 x 2 (O)	½ hr 20MCQ	1 x 20
		80%		**20%**
03 or above	2½ hr 05 out of 06 questions 02 compulsory 03 optional	25 x 2 (C) 10 x 3 (O)	½ hr 20MCQ	1 x 20
		80%		**20%**

(C) – Compulsory questions (O) – Optional questions

10.1.5.1 Theory Examinations

Theory paper consists of two parts:

- Part I is a multiple choice questions paper
- Generally Part II paper is consist of structured essay and essay type questions. However, depending on the course unit evaluated decided by the Faculty Board and the respective Department.

10.1.5.2 Practical Examinations

There shall be a practical examination for majority of courses of study and will include;

a) A practical examination (Spot test/ Practical paper / Practical test) conducted at the end of each semester or a continuous assessment.

b) An oral examination (Viva voce)

10.1.5.3 Continuous Assessments

Method of Continuous assessment for each unit is described in Curriculum of the Degree programme in detail.

10.2 Final Evaluation for Examinations

The final grade for a subject / course will be calculated according to a scheme decided by the Senate.

Grading Procedure, Criteria and Grade Points

The grading procedure adopted by the Senate of the Sabaragamuwa University of Sri Lanka will be adopted. The cut - off points for grades and the grade point will be as follows.

Letter grade	Percentage mark	Grade point
A	≥ 80	4.0
A-	75 – < 80	3.7
B+	70 – < 75	3.3
B	65 – < 70	3.0
B-	60 – < 65	2.7
C+	55 – < 60	2.3
C	50 – < 55	2.0
C-	45 – < 50	1.7
D+	40 – < 45	1.3
D	35 – < 40	1.0
F	< 35	0.0

10.3 GRADE POINT AVERAGE (GPA)

An aggregate index will be calculated as the weighted average of the grade points obtained from grades of different courses and the number of corresponding course units. This index shall be called the GPA.

$$GPA = \frac{\Sigma G_i C_i}{\Sigma C_i}$$

Where G_i = grade point of the i^{th} course

C_i = number of credits of the i^{th} course

The final GPA (FGPA) will be calculated considering the GPA of year1, year 2, year 3 and year 4 which will be weighted by 0.2, 0.2, 0.3 and 0.3 as well as the total number of course units in each year respectively.

The FGPA will be calculated at the completion of all requirements for the degree as follows

$$\text{FGPA} = \frac{\Sigma\, a_j T_j P_j}{\Sigma\, T_j a_j}$$

Where a_j = 0.2, 0.2, 0.3, 0.3 for j = year 1, year 2, year 3, year 4 respectively

T_j = total course units credited in year j

P_j = GPA in year j

10.4 Award of Classes

Classes will be awarded on successful completion of the degree programme entirely on the Final GPA of the student, on the following basis.

Class	Cut-off FGPA for Awarding classes
First Class	3.70
Second Class (Upper)	3.30
Second Class (Lower)	3.00
Pass	2.00

11. AWARDS AT THE CONVOCATION

Vice Chancellor's Gold Medal

(Awarded by Vice Chancellor of Sabaragamuwa University of Sri Lanka)

The overall excellent performance in academic work, sportsmanship, interest in aesthetic and cultural activities, proven leadership, exemplary conduct and character during the academic period in the university

Robert Jayasekara Memorial Gold Medal

(Awarded by Prof. M. U. Jayasekara)

First Class or Second Class Upper Division with the highest final grade point average at the BSc Hons in Agricultural Sciences and Management.

Subasena Mahaliyanaarachchi Memorial Gold Medal

(Awarded by Senior Prof. Rohana P. Mahaliyanaarachchi)

Best performance with the highest final grade point average in the Department of Agribusiness Management with First Class or Second Class Upper Division with the highest final grade point average at the BSc Hons in Agricultural Sciences and Management.

Bandusena Amarasinghe Memorial Gold Medal

(Awarded by Prof. A.A.Y. Amarasinghe)

Best performance with the highest final grade point average in the Department of Export Agriculture with First Class or Second Class Upper Division with the highest final grade point average at the BSc Hons in Agricultural Sciences and Management.

Robert Munasinghe Memorial Gold Medal

(Awarded by Dr. M.A.J.P Munasinghe)

Best performance with the highest final grade point average in the Department of Livestock Production with First Class or Second class Upper Division with the highest final grade point average at the BSc Hons in Agricultural Sciences and Management.

Philip Reginald Premachandra Dissanayake Memorial Gold Medal

(Awarded by Dr. P. K. Dissanayake)

Awarded to the student with the best performance in Horticulture in Export Agriculture of the Faculty of Agricultural Sciences and Management.

Lalith Athulathmudali Memorial Gold Medal

(Awarded by Dr. G. D. K. Kumara)

Awarded to the student with the best academic performance within the Sabaragamuwa University of Sri Lanka.

12. EXAMINATION PROCEDURES, OFFENCES AND PUNISHMENTS

12.1 Rules and Regulations Governing the Holding of Examinations

- Candidates should be at the examination hall 15 minutes before the commencement of the relevant examination. They should enter the examination hall only when informed to do so by the supervisor.
- After entering the examination hall the candidates should be seated at the desk/table bearing their index numbers.
- Candidates are permitted to bring useful items such as pens, pencils, erasers, ink, rulers, geometrical instruments, coloured pencils etc. to the examination hall. No candidate is allowed to bring in any written paper or notes or any kind of electronic device or accessories or any other item, which may be misused at the examination.
- Candidates are not allowed to enter the examination hall 30 minutes after the commencement of an examination and they will not be allowed to leave the examination hall before the lapse of 30 minutes from the commencement of the examination and during the last 15 minutes of the examination.
- Every candidate must bring the examination entry form (admission card), student record book and the student identity card to the examination hall. While the student record book and the identity card should carry the student's photograph and signature, it should also be certified either by the Registrar or an officer authorized by the Registrar. If the names appearing in the student record book/ identity card and those in the examination entry form differs, the candidate has to submit an affidavit to the Registrar. In the event of such certification not being available, the candidate has to submit either the national identity card or a recent photograph certified by an authorized officer.
- When requested by the supervisor of the examination, candidates must surrender all documents in their possession.
- No candidate should ask another candidate for anything, exchange anything, engage in conversation, copy from another or help or encourage another candidate to copy.
- Candidates should write their answers only in the answer sheets or answer books issued on the particular date of the examination.
- Writing paper such as answer sheets, graph paper, drawing paper, ledger and journal sheets required by the candidates will be issued to them at the examination centre. Candidates are advised not to tear, bend crumple or destroy any paper or answer sheet given to them. Writing paper issued only by the supervisor should be used at the examination. Log tables should be used carefully and left on the table after use. All stationery supplied to the candidates, both used and unused, should be left on the desks when candidates leave the examination hall.

- Before answering the question paper, candidates should write their Index number and the name of the examination in the relevant place in the answer script. The Index number should also be written in all other sheets used for answering questions. No candidate should write his/her name or place any identification mark on the answer script. It should also be noted that using the Index number of another is a breach of examination rules.

- All paper used for rough work should be crossed with a line and annexed to the answer script. Rough work should not be done on the examination entry form, timetable or question paper.

- All candidates must maintain strict silence both inside and outside the examination hall and not disturb the supervisor, invigilators and other candidates.

- Except for a practical or field note book or assignment written by himself/ her self, no candidate is allowed to submit any other document written partly or wholly by someone else, with the answer script.

- Impersonation of any kind is strictly prohibited.

- The supervisor or the invigilators have the authority to call for a written statement from a candidate regarding any incident that takes place in the examination hall. Candidates should not refuse to make such a statement or sign such a statement.

- Answer scripts should be personally handed over to the Supervisor or an Invigilator. Answer scripts should not be handed over to anyone else for whatever reason. All candidates should remain seated until all answer scripts are collected.

- Candidates must make sure that they don't have in their possession any document, note or device which can be misused at the examination. They must also ensure that they do not indulge in acts, which can give rise to their being suspected of misconduct at the examination.

12.2 Submitting Medical Certificates for Absence at Examination

Internal candidates who absent themselves for the whole or any part of an examination due to ill health should report to the Medical Officer of the University about it either before the commencement of the examination or during the examination time.

Candidates who fail to do so for unavoidable reasons must submit a medical certificate from a District Medical Officer or a Medical Officer attached to a government hospital, within 14 days of the commencement of the relevant examination or part of the examination*. Medical certificates issued by private medical officers; Ayurvedic physicians or Homeopaths are not accepted.

Candidates who fail to submit a medical certificate for any component of the final examination of a subject will be required to repeat the subject

* Such medicals certificates can be handed over to the dean's office or sent by registered post.

12.3 Examination Malpractices

- Possession of unauthorized documents.
- Copying
- Cheating
- Removal of examination stationery from the examination hall.
- Inappropriate behavior
- Impersonation
- Gaining or attempting to gain unlawful access to the contents of a question paper.
- Aiding or abetting someone to cheat or receiving assistance from someone to cheat.
- Using undue influence on supervisors, invigilators and other examination officials.
- Any other action considered by the Senate as an examination malpractice.

12.4 Procedure for Investigating Examination Malpractices

The supervisor should report any examination malpractice to the Senior Asst. Registrar (Examinations) who will investigate into the matter and submit a report to the sub-committee appointed by the Senate. On the recommendations submitted by the sub-committee, the Senate will impose appropriate punishment on the offenders.

12.5 Punishments for Examination Malpractices

Exam Malpractices	Penalty
Possession of unauthorized documents	Banning examination candidacy for a period of two years or imposing alternative punishment considered appropriate by the Senate.
Copying	Invalidating examination candidacy for a period of 3 years or imposing alternative punishment considered appropriate by the Senate.
Cheating	Cancellation of examination candidacy, debarring candidate from sitting for university examinations for a specific period or imposing any other punishment considered appropriate by the Senate.
Removing examination stationery belonging to the University	Cancellation of examination candidacy and debarring candidate from sitting for university examinations for a period specified by the Senate.
Inappropriate conduct	Cancellation of examination candidacy, debarring candidate from sitting for university examinations for a period not exceeding 05 years and imposing any other punishment considered appropriate by the Senate.
Impersonation	Annulment of candidacy for a period not less than 05 years and not exceeding 10 years and the imposition of any other punishment considered appropriate by the Senate.
Gaining illegal access or attempting to gain such access to the contents of a question paper.	Cancellation of examination candidacy and imposing any other punishment considered appropriate by the Senate.
Aiding and abetting examination malpractices and receiving assistance to commit such malpractices.	Cancellation of examination candidacy and imposing any other punishment considered suitable by the senate.
Attempting to unduly influence examination supervisors and other officials.	Any punishment prescribed by the Senate.

Being guilty of an examination malpractice for the second time.	Cancellation of registration as a student of the university. Compulsory punishments. In addition to the punishments listed above, the following will also be imposed on the recommendation of the Senate: Withholding a class for the degree Limiting the maximum marks obtainable to 40% when re-sitting cancelled question papers. Either cancelling or withholding scholarships and bursaries. Withdraw residential facilities. Withholding invitation to graduation ceremony. Delaying graduation and the release of degree results by one year.

The Senate will decide on the punishments to be imposed for any examination malpractice not mentioned above.

13. PREREQUISITES TO QUALIFY FOR YEAR III (SPECIALIZATIONS)

01. Department of Agribusiness Management

Student must have sat or qualified for sitting for all Agribusiness Management subjects (04 subjects) offered in the 1st year and, at least 02 Agribusiness Management subjects offered in the 2nd year by Department of Agribusiness Management plus any one Farm Practice Course of Department of Export Agriculture or Department of Livestock Production.

02. Department of Export Agriculture

Student must have sat or qualified for sitting for all Export Agriculture subjects (07 subjects) offered in the 1st year and, at least 02 Export Agriculture subjects offered in the 2nd year plus Field Practices in Crop Production Course of Department of Export Agriculture.

03. Department of Livestock Production

Student must have sat or qualified for sitting for all Livestock Production subjects (04 subjects) offered in the 1st year and, at least 02 Livestock Production subjects offered in the 2nd year plus Farm practice course of Department of Livestock Production.

To be selected for the specialization/modules of particular department;

1. First criteria - based on students' choice
2. In case students' demand is greater than the department quota, students will be selected based on their GPA of the subjects already offered by the particular department.

14. GUIDELINES FOR STUDENTS WHO LACK ATTENDANCE

Students who lack attendance have to obey the following guidelines to qualify for the semester examinations of the Faculty of Agricultural Sciences.

1. Students who fail to maintain 80% attendance for a particular subject/s will not qualify for the semester examination of that subject/s except under special circumstances as outlined below;

   a) If a student has maintained at least 60% attendance and has a chronic illness can make an appeal to the Faculty Board. The appeal should be supported with a medical certificate from a specialist doctor and a report from a student counselor in the Faculty.

   b) If a student has maintained at least 60% attendance and has obtained prior approval from the Faculty Board through the University Sports Advisory Committee to participate in university sports activities.

2. Students with less than 80% but have maintained 50% attendance for a particular subject/s will have to fulfill the following requirements in order to qualify for the subsequent semester examinations as first attempt students.

   a) They have to meet the relevant subject coordinator and undertake make-up work.

   b) Submit the prescribed form confirming completion of the make-up work available at the Office of the Dean.

3. Students who fail to maintain 50% attendance for a particular subject/s to qualify as first attempt students for subsequent semester examinations will have to complete the full course in order to be eligible to sit for the examination of the particular subject.

15. CODE OF DISCIPLINE FOR STUDENTS

Section I

General Students' Discipline – Act of Indiscipline and Insubordination

1. The conduct of every student should at all times be exemplary. Throughout his period of studentship he should at all times behave with the decorum to be expected of a graduate.

2. Every student should apply himself to his academic work in such manner as to satisfy the university. No student may absent himself/ herself from lectures or practical work for a period exceeding three weeks in one academic year unless he/ she has obtained special permission or has a valid reason for such absence.

3. No student should commit any of the acts of indiscipline and Insubordination listed below:

   (01) Behaving in such manner as to bring into disrepute or endanger the good name of the university; to obstruct the proper functioning of the education, examination, or administrative activities of the university; to prevent or obstruct a member of the academic/ non-academic staff, or an employee of the university from carrying out his duties; to ridicule or humiliate such a person.

   (02) Failure or inability to produce the Students Record Book, which will be issued to students, when called up-on to do so by the Vice-Chancellor, Dean of the faculty a member of the academic staff, a member of the administrative staff, or by a person authorized by the Vice-Chancellor, or the Registrar, or failure to identify himself/ herself.

   (03) Causing damage to university property; removing such property from the university premises, appropriating it to himself/ herself or to another; defacing, dirtying or defiling the buildings, walls or roads of the university by scratching, writing, drawing, or pasting posters upon them.

   (04) Causing or aiding, abetting, encouraging or sanctioning others to cause injury or harm to the self-respect or dignity of other students, staff officials, employees or lawful visitors to the university, or causing loss, ridicule, danger, mental or physical pain to such person or persons.

   (05) Establishing, organizing, conducting or assisting any activity, organization, or society within the university, apart from those registered in terms of Clauses 112, 114, 115, 116, 117 and 118 of Part II of the Universities Act No.16 of 1978 as amended by the Universities (Amendment) Act No. 7 of 1985.

   (06) Behaving in such manner as to disturb or disrupt, or to gain admittance without permission, or to cause discomfort or harm to participants in any meeting, seminar,

festival, procession, exhibition, variety entertainment, play, film show or religious, cultural or social event, which may have been organized with prior approval from the Vice Chancellor or the Dean of the Faculty by a society or organization which has been registered under the provisions laid-out in section (5) above.

(07) Behaving in such manner as to disturb or disrupt, or to gain admittance without permission, or to cause discomfort or harm to participants in any meeting, seminar, festival, procession, exhibition, variety entertainment, play, film show or religious, cultural or social event, which may have been organized, with prior approval from the Vice Chancellor of the university by the university administration or by the academic or non-academic staff or by an external organization.

(08) Organizing staging, encouraging, sanctioning, or participating in any meeting, seminar, festival, procession, exhibition, variety entertainment, play or film show held within the university premises or in its environs without the prior approval of the Vice Chancellor.

(09) Holding meetings, picketing, demonstrating participating in processions or sloganizing, performing satyagraha, satyakriya of fetes, publishing, drawing, writing, putting or distributing hand bills notices, or posters or encouraging sanctioning or assisting others to commit such action, whether in favour of a university teacher or an official or an employee of the university or in favour some cause out side the university.

(10) Ragging in any form (N.B. any person caught ragging is liable to be expelled from the university without any inquiry being held).

(11) Collecting, or encouraging to collect or sanctioning the collection of money or any other items from students of the university, or the retention or disbursement of such funds or items, by any person whether an office bearer of a registered society or not unless it is with the full written consent of the Vice Chancellor.

(12) Writing, printing, publishing, distributing, exhibiting or pasting either within the university, or in its vicinity, posters, notices, pamphlets or other writing slanderous to any individual or detrimental to the reputation of the university to discipline or to peace.

(13) Publishing, pasting, exhibiting, writing or drawing any notice or poster, in any place other than those authorized for such display, even if such action is in connection with the activities of a society registered with the University in terms of Clause 115 of Part III of the Universities Act. No. 16 of 1978, as amended by the Universities (Amendment) Act. No. 7 of 1985, and even if such notice or posters have been approved by the Vice Chancellor, Dean of the faculty or the relevant teacher.

(14) Publishing, broadcasting, telecasting or releasing to the mass media, whether by the student on his own responsibility, or on behalf of another student or group of students on or behalf a society, any statement article or notice, detrimental to the reputation of the University or insulting or humiliating the university or insulting/ humiliating the university authorities, or any official or employee of the university, or any other person connected with the university.

(15) Consumption, distribution sale or storage of drugs, liquor, within or bringing such into the university or been under the influence of liquor or drugs within the university or encouraging assisting or sanctioning such action by any other person.

(16) Bringing into or keeping or storing within the university, any weapon, explosive or dangerous article or encouraging or assisting in such action.

(17) Non-provision or the avoidance of provision of information needed by or requested by the university or the provision of false or distorted information.

(18) Abuse or misuse of university buildings, ground equipment or other property belonging to the university or their use for unsuitable, unsanctioned or improper purposes non-observation of the rules for their rules.

(19) Students will not be provided with residential facilities for remaining within the university premises during times when the university is closed for students (such time may be subject to periodic changes).

(20) Any act for which the student could be convicted by a lawfully constituted court of law for an offense against the laws of the republic of Sri Lanka.

Section II

Punishments

01. Any student/s found guilty of any offense specified as an act of indiscipline or in subordination in Section (I) above, or of attempting to subvert the provision of this section (Section II – Punishment) may receive one or more of the punishments listed below, as deemed sufficient by the Vice Chancellor acting in accordance with the findings and recommendation of the Disciplinary committee.

(1) A caution or severe warning.

(2) A fine, not exceeding Rs. 500/-

(3) Recovery of any loss sustained by the university.

(4) Suspension from classes, examinations and from the use of all university facilities for a specified period.

(5) Suspension from sitting for examinations of the university for an unspecified period.

(6) Cancellation, postponement or suspension of the release of examination results for an indefinite period.

(7) Regard as having relinquished the course and/ or the university.

(8) Expulsion from the university (The imposition of any one or more of the above

punishments may be suspended. Note that the punishment for ragging will be expulsion from the university).

02. The Vice Chancellor may impose one or more of the punishments listed in Section II, No. 01 (1) to 97) above without holding any preliminary inquiry, and without obtaining the sanction of any other person, and so as to take immediate effect, if he has reason to believe that the actions or behavior of any students could lead to a break-down of discipline in the university or render difficulty in the normal running of the University or lead to a breach of the peace.

03. Any student disaffected by the imposition upon him of one or more of the punishments listed in Section II No. 01 (1) to 97) may appeal against the punishments to the Vice Chancellor within 14 days of being notified of the same.

04. The determination that the Vice-Chancellor shall make on such appeal, in consultation with the council shall be final.

05. Apart from the imposition of the punishment listed in Section II No. 01 (1) to (8), if a student has been guilty of any offence referred to in Section I, the university reserves for itself the right to review and re-evaluate the conduct of such student/s during his/ their period in the university, before conferring upon him any degree, diploma or certificate.

06. Dean of the Faculty was empowered by Council for temporary suspension of a studentship for two weeks without any inquiry in any student found to be involved in the breach of the code of discipline including ragging and report same to the council.

Section III

Interpretation

01. "University" means here the Sabaragamuwa University of Sri Lanka

02. "Property" means here university buildings, plantations, library, furniture, and equipment, vehicles and all other moveable and immovable property.

03. "He", "him", "his, etc., indicate both male and female.

04. The interpretation given to any word, phrase or sentence by the Council will be the final interpretation.

(Subject to revision by the council)

16. DELIVERY METHOD

Classroom lectures, student presentations, group discussions, role plays, online methods, emergency remote teaching, blended teaching and other delivery modes decide by the Faculty Board with the concurrence of the university Senate.

The content and conditioned stipulated herein are subjected to any amendments to be made in line with decisions taken by the Faculty Board and the Senate

Cover Page & Colour Pages : Anura N. Gunarathne
Design & Page Layout : Prasad C. Iddamalgoda

SABARAGAMUWA UNIVERSITY OF SRI LANKA
BELIHULOYA