

FACULTY OF AGRICULTURAL SCIENCE

Undergraduate Programmed Offered :

Bachelor Programme

1. *Bachelor of Bioindustrial Science*
2. *Bachelor of Agriculture (Aquaculture)*
3. *Bachelor of Forestry Science*

STUDY SCHEME (BACHELOR OF BIOINDUSTRIAL SCIENCE)

Notes : L = L , L/T = Laboratory/Tutorial							
SEMESTER 1				SEMESTER 2			
1ST YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
PRT2008	Agriculture and Man	2	0	BBI2423	Academic Interaction and Presentation	2	1
SKP2101	Malaysia Nationhood	3	0	KOM3403	Public Oration	3	0
SSK3000	Information Technology and its Applications	2	1	SKP2203	Islamic Civilization and Asian Civilization	2	0
CAG3000	Microorganism and Plant Diversity	2	1	SKP2204	Ethnic Relation	2	0
MTH3003	Statistics for Applied Sciences	3	1	BGY3201	Plant Structure and Function	2	1
	TOTAL	12	3	CAG3001	Annual Crop Farming Practices	0	1
				CHM3010	Physical and Inorganic Chemistry	3	1
					TOTAL	14	4
2ND YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
BBI2424	Academic Writing	2	1	AFS2001	Green Book Programme	0	2
AHP3507	Production and Management of Livestock Products	2	1	BIP3301	Principles in Bioproduct Processing	2	1
CAG3003	Crop Production and Management	2	1	CAG3004	Plant Propagation and Nursery Management	2	1
CAG3002	Plantation Practices in Industrial Crops	0	1	CSS3701	Crop and Soil Fertility Management	2	1
CPP3600	Plant Protection	2	1	MGM3180	Basic Entrepreneurship	2	1
CSS3700	Soil Science	2	1	SEC3101	Bioindustrial Economics	3	0
PRT3402	Agricultural Biochemistry	2	1	QKXxxx	Cocurriculum	0	1
QKXxxx	Cocurriculum	0	1		TOTAL	11	7
	TOTAL	12	8				
3RD YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
BIP3302	Bioindustrial Biotechnology	2	1	CIT4901	Industrial Training	0	12
BIP3402	Experimental Design and Analysis	2	1		TOTAL	0	12
CES2241	Agricultural Extension	2	1				
CSS3702	Water Resources and Climate	2	1				
	Elective	4	2				
	TOTAL	12	6				
4TH YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
CFP4999A	Final Year Academic Project	0	3	CFP4999B	Final Year Academic Project	0	3
	Elective	10	5		Elective	8	4
	TOTAL	10	8		TOTAL	8	7

STUDY SCHEME (BACHELOR OF AGRICULTURE – AQUACULTURE)

Notes : L = Lecture , L/T = Laboratory/Tutorial							
SEMESTER 1				SEMESTER 2			
1ST YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
AKU3103	Ichthyology	2	1	PRT2008	Agriculture and Man	2	0
BBI2423	Academic Interaction and Presentation	2	1	AKU3106	Aquatic Botany	2	1
AKU3105	Agriculture Production System	2	1	BBI2424	Academic Writing	2	1
AKU3602	Aquatic Ecology	2	1	AKU3109	Fish Physiology and Biochemistry	3	1
SKP2101	Malaysian Nationhood	3	0	SKP2204	Ethnic Relations	2	0
SKP2203	Islamic Civilization and Asian Civilization	2	0	QKXxxx	Cocurriculum	0	1
QKS2112	Basic Swimming	0	1	PPT3301	Principles of Agricultural Management and Marketing	3	0
	JUMLAH /TOTAL	13	5		TOTAL	14	4
2ND YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
PPT3701	Agricultural Entrepreneurship	2	1	TKP3206	Aquaculture Extension	1	1
AKU3201	Principles of Aquaculture	2	1	AKU3301	Fish Genetics and Breeding	2	1
AKU4402	Live Food Production in Aquaculture	2	1	AKU3302	Fish Seed Technology and Fry Management	2	1
AKU3601	Water and Soil Quality in Aquaculture	2	1	AKU3401	Aquaculture Nutrition	2	1
AKU3501	Fish Health Management	2	1	AKU3210	Finfish Culture	1	2
EPT3102	Agricultural Economics	2	1		Electives	2	1
	TOTAL	13	5		TOTAL	10	7
3RD YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
AKU3802	Innovation in Aquaculture	1	2	AKU4959A	Bachelor Dissertation	0	3
AKU3108	Statistics and Research in Aquaculture	3	1		Electives	8	6
AKU3801	Postharvest In Aquaculture	1	1		TOTAL	8	9
	Electives	2	1				
	Electives	2	1				
	TOTAL	9	6				
4TH YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
AKU4959B	Bachelor Dissertation	0	3	AKU4901	Industrial Training	0	12
	Electives	7	3		TOTAL	0	12
	TOTAL	7	6				

STUDY SCHEME (BACHELOR OF FORESTRY SCIENCE)

Notes : L = Lecture , L/T = Laboratory/Tutorial							
SEMESTER 1				SEMESTER 2			
1ST YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
BBI2423	Academic Interaction and Presentation	2	1	BBI2424	Academic Writing	2	1
PRT2008	Agriculture and Man	2	0	KOM3403	Public Oratorion	2	1
SKP2101	Malaysian Nationhood	3	0	SKP2204	Ethnic Relation	2	0
SKP2203	Asian and Islamic Civilization	2	0	FCE3204	Thinking Skills	2	0
FHM3103	Dendrology of Dipterocarps	1	1	FHM3104	Dendrology of Non-Dipterocarps	1	1
FHH3101	Wood Science	2	1	FHM3107	Forest Soil	2	1
FHM3105	Tree Physiology	2	1	FHM3108	Forest Entomology	1	1
QKK2101	Community service (Cocurriculum 2)	0	1	QKKxxxx	Cocurriculum 2	0	1
	TOTAL	14	5		TOTAL	12	6
2ND YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
FHM3106	Forest Ecology	2	1	FHM3109	Forest Pathology	1	1
FHM3201	Forest Survey	2	1	FHM3110	Forestry Economics	3	0
FHM3202	Forest Mensuration	2	1	FHM3206	Geographic Information System in Forestry	2	1
FHM3203	Forest Silviculture	3	1	FHM3301	Forest Management	2	1
FHM3112	Quantitative Methods in Forestry	3	1	FHM3303	Wildlife Management	2	1
FHS4904	Forestry Camp	0	2	FHM3305	Watershed Management	2	1
	TOTAL	12	7	FHM3306	Laws in Forestry	3	0
					TOTAL	15	5
3RD YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
FHM3204	Forest Engineering (Generic elective 1)	2	1	FHS4959A	Bachelor Dissertation	0	3
FHM3304	Forest Plantation Management (Package 1 elective)	2	1	FHM3217	Harvesting System in Forest Plantations (Package 4 elective)	2	1
FHM3307	Nursery Management and Maintainance (Package 2 elective)	2	1	FHM3309	Forest Plantation Certification (Package 5 elective)	1	1
FHM4201	Remote Sensing in Forestry (Package 3 elective)	2	1	XXXxxxx	Open Elective 1	2	1
FHXxxxx	Generic Elective 2	2	1	XXXxxxx	Open Elective 2	2	1
FHXxxxx	Generic Elective 3	2	1		TOTAL	7	7
	TOTAL	12	6				
4TH YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
FHS4959B	Bachelor Dissertation	0	3	FHS4903	Industrial Training	0	8
MGM3180	Entrepreneurship	2	1		TOTAL	0	8
FHH3230	Wood Quality and Products (Package 6 elective)	2	1				
FHM3308	Fire Management in Forest Plantations (Package 7 elective)	1	1				
FHXxxxx	Package 8 elective	1	1				
	TOTAL	6	7				

COURSE SYNOPSIS

Department Of Crop Science

AFS2001 Green Book Programme 2(0+2)

Prerequisite : None

This course covers training and fieldwork in the production of vegetables, legumes, nursery, orchard, pasture and aquatic life. Training and fieldwork are conducted into two semesters by the academicians and supporting staff.

SKP2101 Malaysian Nationhood 3(3+0)

Prerequisite : None

This course covers nation's history, the struggle for independence, the formation of the Federation of Malaysia, history, characteristics and problems of plural society, Parliamentary Democracy system, electoral system, Malaysian Constitution, Rukunegara, Constitutional, Monarchy, Public Administration and national policies.

SKP2203 Islamic Civilization and Asian Civilization 2(2+1)

Prerequisite : None

This course covers civilizational studies which include introduction to civilization, interaction between civilizations (Malay, Chinese, Indian), Islam in Malay Civilization and its role in building Malaysian Civilization, contemporary issues in Islamic Civilization and Asian Civilization in the process of national development

SKP2204 Ethnic Relation 2(2+0)

Prerequisite : None

This course covers basic concepts of cultural and ethnic relations, development of ethnic relations in Malaysia, global challenges in cultural and ethnic relations in Malaysia and Asia and ethnic relations from Islamic perspective

CES2241 Agricultural Extension 3(2+1)

Prerequisite : None

This course covers the planning implementation and evaluation of agricultural extension programmes. Factors that influence the effectiveness of an extension programme and delivery methods for different target groups are also emphasised. Case studies in selected areas and targetted groups, method demonstration and technology transfer are based on actual needs.

BIP3301 Principles in Bioproduct Processing 3(2+1)

Prerequisite : None

This course covers principles involved in processing of natural resources and agro-industrial materials into value-added products in a cost-effective system. Emphasis is on fermentation, biocatalyst, dehydration and thermal processing, freezing and refrigeration, separation techniques, tanning, irradiation, chemical processes and pressing and packaging.

BIP3302 Bioindustrial Biotechnology 3(2+1)

Prerequisite : None

This course covers bioindustrial biotechnology which includes historical background, current applications and future directions. Technologies employed and their applications in bioindustry are discussed, which include in vitro technology, recombinant DNA technology, genetic engineering, molecular marker techniques and bioproducts. The application of biotechnology in bioindustry is emphasized. Cultural and ethical issues pertaining to biotechnology are also highlighted.

BIP3402 Experimental Design and Analysis 3(2+1)

Prerequisite : None

This course covers principles and procedures in experimentation using proper experimental design and statistical analysis. Emphasis is on knowledge and skills on the use of important experimental design that include completely randomized design (CRD), randomized complete block design (RCBD), and split plot design together with statistical analysis including t-test, analysis of variance (ANOVA) to compare treatment effects, mean comparisons (least significant different of LSD, Duncan's multiple range test or DMRT and orthogonal contrast), linear and curvilinear regression analyses to detect trends, main and interaction effects in factorial experiments, and non-parametric methods are also explained.

CFP4999 Final Year Academic Project 6(0+6)

Prerequisite : None

This course covers planning, implementation, data analysis and interpretation, preparation, and presentation of scientific report. Students are required to identify a research topic with guidance from the supervisor

CHM3010 Physical and Inorganic Chemistry 4(3+1)

Prerequisite : None

This course covers basic aspects of physical and inorganic chemistry, which covers modern atomic theory, periodic table and periodic properties, main group element, theory of bonding, properties of gas, liquid and solids, kinetics and nuclear chemistry.

CSS3702 Water Resources and Climate 3(2+1)

Prerequisite : None

This course covers different types of water resources and hydrologic cycle. The effects of changing climate factors such as precipitation, temperature, humidity, wind and radiation on water resources, land and agriculture are also emphasised

SEC3101 Bioindustrial Economics 3(3+0)

Prerequisite : None

This course discusses about the scope of economics, production and cost theories, resource economics, marketing, and international trade

AHP3507 Production and Management of Livestock Products 3(2+1)

Prerequisite : None

This course covers extensive and intensive ruminant and non-ruminant livestock production, the importance of animal industry and modern livestock husbandry, and handling and processing of livestock products. Emphasis is on good husbandry practices in livestock production

BGY3201 Plant Structure and Function 3(2+1)

Prerequisite : None

This course covers the diversity of the morphology and anatomy, primary and secondary growth of the root and stem, and adaptation of plant organs. Development of pollen and embryo sac, fertilization, formation of fruit and seed, as well as dispersal are also discussed.

CAG3000 Microorganism and Plant Diversity 3(2+1)

Prerequisite : None

The course covers major phylum of organisms on earth. Emphasize is given to differentiate organisms based on their distinct characteristics. The importance of interspecific interactions and its surroundings are also discussed

- CAG3001 Annual Crop Farming Practices** 1(0+1)
Prerequisite : None
This course covers practical training in various short-term crops. Emphasis is on planning, implementation and handling of crop production enterprises, attitudes and agriculture ethics, besides skills in managing annual crops
- CAG3002 Plantation Practices in Industrial Crops** 1(0+1)
Prerequisite : None
This course covers commercial management practices in industrial crops including postharvest handling, grading and processing. The practical training includes handling and operating agriculture machineries and equipments required in plantation development
- CAG3003 Crop Production and Management** 3(2+1)
Prerequisite : None
This course covers principles and practices in managing crops. Factors influencing crop growth such as soil, light, water, nutrients, pests and diseases are emphasised. Environmental friendly farming practices are also discussed
- CAG3004 Plant Propagation and Nursery Management** 3(2+1)
Prerequisite : None
This course covers factors associated with propagation success from the aspect of biotic and abiotic factors. Emphasis is on application of hormones, water manipulation, media and nursery facilities, and seedling management in the nursery stage
- CPP3600 Plant Protection** 3(2+1)
Prerequisite : None
This course covers basic plant protection including entomology, plant pathology, weed science and nematology. Emphasis is on the biology, physiology, ecology and epidemiology of major pests and diseases, identification and classification, biotic and abiotic pests and some beneficial species, diagnosis and solving pest and disease problems in agriculture and bioindustry as well as their management
- CIT4901 Industrial Training** 12(0+12)
Prerequisite : None
This course involves industrial training for a period of 24 weeks at any one of selected government agencies, company or factory. The training is organised by the course coordinator and conducted by the supervisor or manager of the agency, company or factory
- CSS3700 Soil Science** 3(2+1)
Prerequisite : None
This course covers soil formation, chemical, physical and biological characteristics of soil, plant nutrition and fertilizer, soil survey, classification and soil evaluation
- CSS3701 Crop and Soil Fertility Management** 3(2+1)
Prerequisite : None
This course covers characteristics of Malaysian soils and their relationship to agriculture sector. Ecology of soils in relation to plants and the management of soil fertility are emphasised

MGM3180 Basic Entrepreneurship 3(2+1)

Prerequisite : None

The course covers various aspects entrepreneurial knowledge and includes techniques to carry out entrepreneurial activities and basic management skills required in a business undertaking.

MTH3003 Statistics for Applied Sciences 4(3+1)

Prerequisite : None

This course covers data descriptive, probability, random variables, several important distributions and inferential statistics including the sampling distribution, point estimation, confidence intervals and hypothesis testing. Analysis of variance, experimental designs, simple linear regressions and correlations are emphasized.

PRT3402 Agricultural Biochemistry 3(2+1)

Prerequisite : None

This course covers biochemical processes in eukaryotic system which include cell organization, properties of water and molecular interactions in aqueous environment, structure and roles of biomolecules, catalysis and control of biochemical reactions, structure and roles of membranes and hormones, metabolism and bioenergetics and flow of biological information

CAT4100 Precision Agriculture 3(2+1)

Prerequisite : None

This course covers concepts and practices on precision agriculture in the context of modern sustainable agriculture in relation to agricultural development technologies in the information age. The important aspects in measuring variability of its practice covers sampling procedures, nutrient, yield and pest mapping, interpolation of spatial patterns and geographical information system (GIS); modeling and simulation of crop growth, use of remote sensing data and statistical methods of data analysis; operation and usage of instruments such as GPS (Global Positioning System), earth satellite infra-red camera, space satellites, yield sensors and various computer software

CAG4101 Seed Technology 3(2+1)

Prerequisite : None

This course covers the process of formation, development, germination, dormancy, testing and storage of seeds. Seed production and processing are also emphasized

CAT4106 Agricultural Waste Management 3(2+1)

Prerequisite : None

This course covers different types of agricultural wastes, environmental problems and environmental friendly waste management for disposal and/or utilization, recycling of green wastes as mulches and source of nutrients, composting and environmental regulatory enforcement aspects

CPP4600 Pesticide Science 3(2+1)

Prerequisite : None

This course covers the physico-chemical properties of pesticides in relation to their usage, activities, interaction with living systems, toxicity, selectivity, resistancy, use of biological agents, formulation, role of surfactants/adjuvants, pesticide application technology as well as methods of studying and measuring pest response to pesticide

CPT4800 Chemistry and Processing of Plant Based Commodities 3(2+1)

Prerequisite : None

This course covers physico-chemical and biochemical changes of plant based commodities during handling, processing and storage. The course content encompasses processing technology for plant products such as fats, oils, fruits, vegetables, cereals and legumes

CPT4801 Chemistry and Processing of Animal Based Commodities 3(2+1)

Prerequisite : None

This course covers physico-chemical and biochemical changes of selected commodities based on food of animal origin during handling, processing and storage. The course content encompasses the technology for the processing of meat, poultry, fish, dairy and other animal products

AHP4401 Animal Nutrition 3(2+1)

Prerequisite : None

The course covers macro nutrition, minerals and complimentary supplements in producing livestock. Emphasis is given on the production of livestock feed using available resources and focus on formulation of animal feeds

AHP4504 Integrated Livestock Systems 3(2+1)

Prerequisite : None

This course covers the principles and concepts in integrated livestock systems. Emphasis is on the development aspect of integrated farming system that is competitive and environmental friendly that takes into account biological and economic effect

CAG4000 Crop Nutrition 3(2+1)

Prerequisite : None

This course encompasses the role and function of major nutrient elements, metabolism, absorption, interactions amongst nutrients and the capacity of media to supply nutrients, effect of nutrient deficiencies, excesses and toxicity on growth, yield of crops and the environment, as well as influence of nutrient composition on the utilization of plant products

CAG4001 Plant Breeding 3(2+1)

Prerequisite : None

The course covers plant reproductive systems, inheritance of qualitative and quantitative characters, heritability, selection methods for self and cross-pollinated crops, breeding through hybridization, mutation, wide hybridization and other breeding methods

CAG4002 Plant Botany 3(2+1)

Prerequisite : None

This course covers agricultural crops and focuses on plant morphology, anatomy and taxonomy. Plant morphology includes vegetative and reproductive morphology while anatomy relates to structure and function of plant cells and tissues. Plant taxonomy covers processes of nomenclature and classification of plants

CAG4003 Economic Botany 3(2+1)

Prerequisite : None

This course covers history of crop commercialization, plant manipulation process, identification of valuable parts of plants and the benefit of crops to humans worldwide. This includes the evaluation of plants important in the spice, food, beverage, medical and cosmetic industries

- CAT4102 Plant Tissue Culture** 3(2+1)
Prerequisite : None
This course covers principles and techniques of in vitro plant propagation, with emphasis on current production and management systems and their application in the propagation of selected horticultural crops
- CAT4103 Applied Microbiology** 3(2+1)
Prerequisite : None
This course covers morphological and growth characteristics of bacteria, mycoplasma, fungi, actinomycocets, algae and viruses, metabolism, biochemistry and genetics of microbes, microbiological and aseptic techniques. Emphasis is on identification and differentiate diversify of microbes using suitable methods and equipment
- CAT4104 Food Microbiology** 3(2+1)
Prerequisite : None
This course covers role of microorganisms in food processing and preservation, relation of microorganisms to food spoilage, foodborne illness and intoxication, general food quality, and role of microorganisms in health promotion
- CAT4105 Fermentation Technology** 3(2+1)
Prerequisite : None
This course covers important aspects of fermentation technology such as isolation of microbes and improvement of strains for industrial applications, storage of microorganisms, media formulation, sterilization process, inocula preparation, bioreactor design, process control in fermentation, various modes of fermenter operation and basic aspects of fermentation kinetics and modeling. Emphasis is on fermentation products from microbial, animal and plant sources
- CAT4107 Water and Waste Water Treatment** 3(2+1)
Prerequisite : None
This course focuses on the methods of analyzing and treatment of water and waste water. Emphasis is on application of technologies that are environmental friendly and effective in controlling sources of pollution of water resources
- CAT4108 Municipal, Hazardous and Biomedical Waste Management** 3(2+1)
Prerequisite : None
This course covers various aspects in waste disposal and treatment. Emphasis is on the aspects of waste treatment based on biotechnology
- CPP4601 Pest Management** 3(2+1)
Prerequisite : None
This course covers principles and methods in pest control (insects, diseases and nematode parasite) of agricultural crops. Emphasis is on ecological aspects of pest control, pest infestation evaluation, crop loss and adoption of suitable control measures especially on integrated pest management
- CPT4802 Postharvest Technology** 3(2+1)
Prerequisite : None
This course covers principles and technology in postharvest handling of crop product. Focus is on hormone, temperature and moisture manipulation for controlling ripening and storage. Suitable technology for grading, processing and storing are emphasized
- CPT4804 Handling and Transportation of Bioindustry Product** 3(2+1)
Prerequisite : None
This course covers methods in handling and transportation of bioindustrial product by focusing on product quality and life span. Emphasis is on aspects of quality conservation of the bioproduct

- CPT4805 Downstream Processing Technology** 3(2+1)
Prerequisite : None
This course covers the principles and methods in downstream processing of bio-products. Emphasis is on production of quality downstream products
- CPT4806 Crop Produce Processing Technology** 3(2+1)
Prerequisite : None
This course covers processing of crop produce, characteristics of crop produce, principle of processing technology, processing of commodity and food crops with emphasis on utilization of technology
- CSS4700 Pollution Ecology** 3(2+1)
Prerequisite : None
This course covers ecology, ecotoxicology and biodiversity aspects that focuses on the sources and effects of pollution. Emphasis is on the effects of pollution, methods of assessment and conservation
- CSS4701 Sustainable Land Management** 3(2+1)
Prerequisite : None
This course encompasses the concept of sustainable land use, methods of assessing land quality and improvement requirement as well as land purpose as sink for pollutants. Emphasis is given on the management and uses of land
- SAB4401 Marketing of Agro-bio Product** 3(2+1)
Prerequisite : None
This course covers principles of marketing, trends and problems in marketing of agro-bio products. Structure, behaviour, and system of marketing activities, which include marketing risk are also being emphasised. This course also focuses on the management of marketing activities in agro-bio industries which emphasises on the application of marketing mix in the formation of a sustainable marketing plan
- SFC3200 Instrumental Methods** 3(2+1)
Prerequisite : None
This course covers theoretical and practical knowledge of a variety of analytical instrumentation. The course concentrates on the modern instrumentation commonly use in industrial and research laboratories. The theory and application of instrumental techniques such as spectroscopy, chromatography, thermal analysis and biotechnology are discussed. The techniques of method development, sample preparation, optimization of operating conditions to obtain high accuracy, reproducible results and data analysis are also introduced

Department of Animal Science and Fishery

- PPT3301 Principles of Agricultural Management and Marketing** 3 (3+0)
Prerequisite : None
This course encompasses basic concepts of agricultural marketing and management, marketing environment and influence of government policies on agribusiness.
- PPT3701 Agricultural Entrepreneurship** 3 (1+2)
Prerequisite : None
This course covers the concepts of entrepreneurship, the characteristics of an entrepreneur, preparation of a business plan, implementation of project marketing, credit, business strategies, management of resources and current issues of entrepreneurship in agriculture.
- EPT3102 Agricultural Economics** 3 (2+1)
Prerequisite : ECN3100
This course covers the application of basic concept of economic theory in the field of agriculture and its relation to market structure, supply and demand, government policies, and international trade.
- TKP3206 Aquaculture Extension** 2 (1+1)
Prerequisite : None
This course covers the skills and knowledge to develop effective programs and training in aquaculture extension services to community. Extension projects in aquaculture are conducted based on economics and community development.
- AKU3103 Ichthyology** 3 (2+1)
Prerequisite : None
This course covers the diversity of fish biology and ecology. Comparison in structural, behavioural and adaptive ability of fishes in diverse geographical spaces are discussed.
- AKU3105 Biology of Aquatic Invertebrates** 3(2+1)
Prerequisite : None
The course covers diversity and biological characteristics of groups and species of aquatic invertebrates living in marine and freshwater ecosystems. Relationship between adaptation and survival of invertebrates with its structure and biological system is emphasised.
- AKU3106 Aquatic Botany** 3 (2+1)
Prerequisite : None
This course covers the taxonomy and classification, important characteristic for each main group of aquatic plants based on the freshwater and marine environments. Utilization, importance and threats to aquatic plants are discussed.
- AKU3108 Statistics and Research in Aquaculture** 4 (3+1)
Prerequisite : None
This course covers the fundamental of statistics and data analysis in aquaculture and fisheries. This course emphasises on interpretation of results of data analysis in the real-life situation, besides emphasises on the experimental design using appropriate statistical formulation.
- AKU3109 Fish Physiology and Biochemistry** 3 (2+1)
Prerequisite : None
This course covers the main system, function and physiological components for continuous homeostasis in aquatic life. Biochemical and fish physiological processes relevant to the environment and various metabolic pathways in aquatic organisms are emphasized.

- AKU3201 Principles Of Aquaculture** 3 (2+1)
Prerequisite : None
This course covers basic principle of aquaculture for food security. The processes involved in pre-production, production and post-production of sustainable aquaculture according to standard practices are discussed.
- AKU3210 Finfish Culture** 3 (1+2)
Prerequisite : None
This course covers culture and management of food fish both in fresh and seawater. This course emphasises husbandry, feed management, water management, good aquaculture practices and post harvest handling.
- AKU3301 Fish Genetics And Breeding** 3 (2+1)
Prerequisite : None
This course covers concepts of fish genetics, breeding, hybridisation and genetic engineering. Problem solving for selective breeding in fish are discussed.
- AKU3302 Fish Seed Technology And Fry Management** 3 (2+1)
Prerequisite : None
This course covers fish reproductive biology, fish seed production techniques, larviculture, management, packaging and transportation of fry. Issues in fish breeding are discussed.
- AKU3401 Aquaculture Nutrition** 3 (2+1)
Prerequisite : None
Kursus ini merangkumi amalan penyediaan dan pemberian makanan dalam akuakultur. Nutrisi dalam bahan makanan untuk pertumbuhan optima haiwan akuatik, isu semasa dan kekangan dalam pemakanan akuakultur diberi penekanan.
This course covers preparation and feeding practices in aquaculture. Nutrition in feed ingredients for optimal growth of aquatic animals, current issues and limitations in aquaculture nutrition are emphasized.
- AKU3501 Fish Health Management** 3 (2+1)
Prerequisite : None
This course covers concepts of pathology, microbiology and parasitology in relation to fish diseases, diagnostic procedures, control and treatment. The importance of good husbandry, control and prevention of diseases in aquaculture are discussed.
- AKU3601 Water and Soil Quality in Aquaculture** 3 (2+1)
Prerequisite : None
This course covers theory and determination of water and soil quality for site selection. Analysis and interpretation of physico chemical of water and soil are emphasized.
- AKU3602 Aquatic Ecology** 3 (2+1)
Prerequisite : None
This course covers the major components of aquatic ecology and ecological parameters measurement techniques. Negative impacts towards aquatic ecosystem as well as the monitoring and the remediation techniques are discussed.
- AKU3801 Postharvest In Aquaculture** 3 (2+1)
Prerequisite : None
This course covers handling of various types of aquatic produce, processing and quality control. Value added product and byproduct of aquatic produce are discussed.

- AKU3802 Innovation in Aquaculture** 3 (1+2)
 Prerequisite : None
 This course covers theory and product innovation, constraint and challenges in aquaculture sector. Creativity and innovation of product and aquaculture technology are emphasized.
- AKU4101 Fisheries Resource Assessment and Management** 3 (2+1)
 Prerequisite : None
 This course covers the classification of fishery resources, fishing techniques and policies, population dynamics and management of fisheries. Application of computer software in fish stock assessment and sustainable fisheries resource management are discussed.
- AKU4102 Limnology** 3 (2+1)
 Prerequisite : None
 This course covers the biotic components and biological productivity of fresh water ecosystems and the physico-chemical processes affecting them. The importance and application of limnology in inland fisheries and aquaculture management are emphasized.
- AKU4103 Oceanography** 3 (2+1)
 Prerequisite : None
 This course covers physical, chemical and biological factors in marine ecosystems. Impacts of anthropogenic activities, climate change and the solutions are discussed for the sustainability of fisheries and aquaculture.
- AKU4202 Culture of Ornamental Fish and Aquatic Plants** 3 (1+2)
 Prerequisite : None
 This course covers the cultures of selected ornamental fishes and aquatic plants. Methods and manipulation of cultures as well as management of potential ornamental fishes and plants for commercialization are discussed.
- AKU4203 Aquaculture Production Systems** 3 (2+1)
 Prerequisite : None
 This course covers design, basic equipment selection and construction of various aquaculture systems. The management and efficiency of the systems for optimal operation are discussed.
- AKU4204 Unique Species Culture** 2 (2+0)
 Prerequisite : None
 The course encompasses the culture techniques and management of various unique aquatic species in Malaysian waters. Marine and fresh water unique species which are yet to be cultured commercially in Malaysian aquaculture industry are emphasised. Usage of product from each unique species are discussed.
- AKU4221 Crustacean Culture** 3 (1+2)
 Prerequisite : None
 This course covers the biology and skills of culture on selected commercial crustaceans. Issues and problems in crustacean culture industry are discussed.
- AKU4231 Mollusc Culture** 3 (1+2)
 Prerequisite : None
 The course covers the culture of commercial mollusc species. Improvement of cultured species through genetic selection and manipulation of culture procedures are emphasised. Conservation and management in organic extractive aquaculture are discussed.

- AKU4301 Fish Endocrinology** 3 (2+1)
Prerequisite : None
This course covers the chemical biosynthesis, structures and functions of hormones from the endocrine glands. Problems related to fish endocrinology are emphasised. Reaction and roles of hormones on physical and chemical stresses in aquatic environment are discussed.
- AKU4401 Aquafeed Technology** 3 (1+2)
Prerequisite : None
This course covers various formulation and technologies for fish feed production. Every stage of feed processing and quality control for aquaculture industry are emphasized.
- AKU4402 Live Food Production in Aquaculture** 3 (2+1)
Prerequisite : None
This course covers the importance of live food production in aquaculture. Types, production techniques and preparation of live food in aquaculture industry are emphasized.
- AKU4243 Algae Culture** 3 (2+1)
Prerequisite : None
This course covers various propagation and culture techniques for microalgae and macroalgae culture. Selected commercial algae based on ecological and economical importance are discussed.
- AKU4501 Aquatic Microbiology** 3 (2+1)
Prerequisite : None
This course covers the roles, effects, identification techniques and relations of microorganisms in aquaculture. The importance, applications and current issues of microbiology in aquaculture are discussed.
- AKU4502 Fish Immunology** 3 (2+1)
Prerequisite : None
This course covers the concepts, types, responses and immunomodulators in fish immune system. The importance and application of fish immunology for diseases prevention in aquaculture are discussed.
- AKU4601 Ecology and Management of Wetlands** 3 (2+1)
Prerequisite : None
This course covers the various natural and constructed wetland ecosystems, function and their importance. Management of various wetland ecosystems and factors affecting their living resources due to climate change and environment are discussed.
- AKU4701 Information and Communications Technology in Aquaculture** 3 (1+2)
Prerequisite : None
This course covers the utilization and importance of information and communications technology in aquaculture. The suitability of communications and information technology in aquaculture operation and management is discussed.
- AKU4801 Recreational Fisheries in Inland Waters Ecotourism** 3 (2+1)
Prerequisite : None
This course covers on the concept of biology and socio-economic in recreational fisheries management as alternatives for resource management. Implementation and operation of recreational fisheries in Malaysia and aspect of eco-tourism are discussed.
- AKU4802 Molecular Biology in Aquaculture** 3 (2+1)
Prerequisite : None
This course covers concepts and molecular biology techniques for cells of plants, animals and aquatic microbes. Application of genetic engineering and current issues of biotechnology in aquaculture are discussed.

AKU4804 Policy and Acts for Fisheries and Aquaculture

2(2+0)

Prerequisite : None

This course covers the policy, act and legislation in fisheries and aquaculture. Implementation of rules and law in fisheries and aquaculture are emphasised. The importance of enforcement in fisheries and aquaculture resource management are discussed.

AKU4901 Industrial Training

12 (0+12)

Prerequisite : Coordinator Approval

This course involves student attachment at a private or government aquaculture farm. A practical exposure to the actual working conditions and management practices carried out in the field of aquaculture and fisheries are emphasised through short term projects.

AKU4959 Bachelor Dissertation

6 (0+6)

Prerequisite : None

This course covers literature review, use of appropriate research techniques, data collection and analyses, interpretation of results, discussion, conclusion and originality of scientific studies in research project.

Department of Forestry Science

- FHH3101 Wood Science** 4 (3+1)
Prerequisite : None
This course introduces student on the importance of wood to human life. The teaching will focus on the anatomical, chemical, physical, and mechanical properties of wood in relation to the processing and production of wood-based products. The student is exposed to the identification technique of various commercial wood species
- FHH3201 Non-Wood Forest Products** 3 (2+1)
Prerequisite : None
This course covers the history, types of non-wood forest products, i.e., rattan, bamboo, phytochemicals, medicinal plants and palms. Collection and its distribution process by means of appropriate technology in manufacturing end products towards the development of cottage industries as well as socio-economic development.
- FHH3230 Wood Quality and Products** 3 (2+1)
Prerequisite : None
This course encompasses the basic knowledge about forest plantation woods and its utilization. Wood structure and properties as well as methods to improve wood quality are emphasized. Impact and effects of replanting including pruning, selection and production of quality timbers are discussed
- FHM3103 Dendrology of Dipterocarps** 3 (2+1)
Prerequisite : None
This course introduces student to dendrology in forestry and plant taxonomy. The teaching focuses on morphological characters for identification of Gymnosperm and Angiosperm. Students are also exposed to value of diversities of plants and its habitats.
- FHM3104 Dendrology of Non-Dipterocarps** 2 (1+1)
Prerequisite : None
This course discuss on the dendrology of family non-Dipterocarps. Emphasizes are on modern nomenclature, plant habitats, keys identification, botanical indicators and collection of herbarium specimens. Description on family and genera for non-dipterocarps and its importance in forestry is discussed.
- FHM3105 Tree Physiology** 3 (2+1)
Prerequisite : None
This course covers the role, function and process of tree physiology within forest ecosystem includes photosynthesis, carbohydrate metabolism, assimilation and respiration. The relationship between tree physiological processes with environmental factor such as absorption, movement and loss of water, and sexual and asexual reproductions is discussed. This course focusses on the appropriate techniques for tree physiological measurement.
- FHM3106 Forest Ecology** 3 (2+1)
Prerequisite : None
This course emphasises on ecological concept, including environmental factors such as edaphic, climatic and biotic variables that influence the growth and development of vegetation, forest classification as well as community dynamics and processes such as organic matter production, energy flow and nutrient cycling.
- FHM3107 Forest Soil** 3 (2+1)
Prerequisite : None
This course covers topics in soil sciences including chemical, physical and biological properties, soil classification and identification, effects of forest activities on soil properties as well as site index.

- FHM3108 Forest Entomology** 2 (1+1)
Prerequisite : None
This course encompasses the identification and classification of selected forest insects. Students will understand the ecology, biology and importance of insects associated with natural forest, plantation and urban forest. Methods of diagnosing, sampling and tree insect pest control based on insect pest management principles are emphasized.
- FHM3109 Forest Pathology** 2 (1+1)
Prerequisite : None
This course covers plant disease concept, disease symptoms and signs. Emphasis is given on factors in disease formation, disease diagnosis, classification of fungal pathogen, biology of important pathogens and pathogenesis. Host and pathogen interaction, defense mechanism, and control methods for forest tree diseases are also discussed.
- FHM3110 Forestry Economics** 3 (3+0)
Prerequisite : None
This course covers concepts and theories in forest economic. These include of market structure, production economics, demand and supply of forest goods and services. Economic valuation of forest resources and payment for ecosystem services (PES) are emphasized. Investment analysis of forestry projects, and the role of forestry sector in national economic development are discussed.
- FHM3112 Quantitative Methods in Forestry** 4 (3+1)
Prerequisite : None
This course covers parametric and non-parametric of data description and analyses in forestry. The pattern of random variables and some common distributions of parameters are emphasized. Sampling techniques, experimental designs, experimental errors, correlations and linear regression are discussed
- FHM3201 Forest Survey** 3 (2+1)
Prerequisite : None
This course covers the basic principles of forest survey, technique of linear and angular measurements which are applied in forestry. The content of this course includes methods of forest area measurement and plan preparation. Calculation technique for data accuracy and appropriate corrections are discussed
- FHM3202 Forest Mensuration** 3 (2+1)
Prerequisite : None
This course covers the principles of measurement and tree measurement with emphasis on relationship between assessment and tree and stand variables. Growth and yield increment, site index, stocking, stand density including planning and conducting forest resource inventory according to sampling techniques used in Malaysia are also discussed.
- FHM3203 Forest Silviculture** 3 (2+1)
Prerequisite : None
This course encompasses the concepts and theory of silviculture, general silvicultural systems practiced in tropical forest., Emphasis is given to the development of silviculture system in Malaysia that includes the current systems and methods. Aspects of introduction and establishment of forest plantation as well as appropriate silviculture treatments are discussed.
- FHM3204 Forest Engineering** 3 (2+1)
Prerequisite : None
This course encompasses forest engineering, building material science, analysis of slope stability and retaining wall, torque, rimpull, selected forest machinery as well as economics of forest engineering including costs of machinery and replacement, including evaluation of alternative costs.

- FHM3206 Geographic Information System in Forestry** 3 (2+1)
Prerequisite : None
This course covers basic concepts of geographic information system (GIS). The content of this course includes method of design and data base development, automation, processing, analysis, display, and modelling of data. It is to support decision making, including case studies of GIS in forestry.
- FHM3213 Agroforestry** 3 (2+1)
Prerequisite : None
This course introduces principle of tropical agroforestry system in tropic. The teaching focuses on appropriate systems and the interactions of the agroforestry system with the environment and social. Economic analysis is used to assess the positive return of the agroforestry system.
- FHM3214 Seed Technology** 2 (1+1)
Prerequisite : None
The course discussed issue related to seed production of selected forest species and fibre crops. Seed technology and its potential effects on the yield and quality of seeds are emphasized. Physiological aspects of seed production including phenology, dormancy and storage; and the decision support system such as seed certification and seed research are emphasized
- FHM3217 Harvesting System in Forest Plantations** 3 (2+1)
Prerequisite : None
This course will discuss the preparation of sustainable forest plantation harvesting plan. It includes analyzing the rate of timber production, harvesting costs, and controlling costs. Important aspects within the construction of forest plantations roads, planted forest harvesting systems and techniques, and cutting cycle in forest plantation are discussed.
- FHM3218 Planting Material Production for Forest Plantation** 3 (2+1)
Prerequisite : None
The course comprises various techniques in producing plant material for forest plantations. These includes natural breeding, tissue culture, genetic selection, DNA recombinant and transgenic plant. Emphasis is given in producing a quality product to achieve the operational goals of forest plantations.
- FHM3301 Forest Management** 3 (2+1)
Prerequisite : None
This course covers the functions and importance of sustainable 220 forest management in Malaysia. The principles and standard of international forest management related to the sustainable yield, rotation and cutting cycle, the manipulation of growing stock, yield, and regulation of fellings related to forest management system in Malaysia are discussed. Forest certification and verification of forest products from sustainable forest are emphasized.
- FHM3303 Wildlife Management** 3 (2+1)
Prerequisite : None
The course encompasses classification and ecological aspect of wildlife in Malaysia includes population dynamics, habitat requirement, pressure and disturbance of original habitat. Population measurement through sampling techniques for population estimation is emphasized. Principles of forest management towards wildlife, conservation, current and future status, functions of agencies, national policies and public awareness is discussed.
- FHM3304 Forest Plantation Management** 3 (2+1)
Prerequisite : None
This course encompasses the establishment and nursery management until maturity of forest plantation. Activities of forest plantation includes management of seed sources, site preparation, planting, enspacement, fertilization, protection, thinning, pruning and rotation are emphasized. Issues and good practices in forest plantation management are covered

- FHM3305 Watershed Management** 3 (2+1)
 Prerequisite : None
 The course covers water problems and approaches to their solutions, hydrological cycle, water catchment area and its relation to rainfall, ground water, evapotranspiration, runoff, floods and soil erosion, control methods for water quality and quantity in watershed management as well as related social problems.
- FHM3306 Laws in Forestry** 3 (3+0)
 Prerequisite : None
 This course encompasses provisions of laws in forestry sectors including natural resource, environment, wildlife, national parks, water and upstream industries. Differences between related state laws are emphasized. Application of laws to solve current forest management are discussed.
- FHM3307 Nursery Management and Maintainance** 2 (1+1)
 Prerequisite : None
 This course discusses basic of nursery establishment based on good practices for conservation and business purposes. Emphasized are given on nursery establishment techniques, plant and infrastructure maintenance. Plant propagation techniques and plant marketing are discussed
- FHM3308 Fire Management in Forest Plantations** 2 (1+1)
 Prerequisite : None
 This course covers the concept and causes of fire in forest plantations. It explains effects of forest fire on soil, plants and wildlife. Students are exposed to Fire Danger Rating System for Southeast Asia and it's application in the management of fire in forest plantations.
- FHM3309 Forest Plantation Certification** 2 (1+1)
 Prerequisite : None
 This course provides an overview of the purpose and requirements of the Malaysian Criteria and Indicators for Forest Plantation Management Certification (MC&I Forest Plantations). It explains on the understanding and interpretation of the 10 principles and 55 criteria of MC&I Forest Plantations. Role of national governing body in developing certification standards and other certification processes are studied.
- FHM4101 Biodiversity and Conservation** 3 (2+1)
 Prerequisite : None
 This course encompasses theory and principle in biodiversity and conservation that includes definition, level in biodiversity, definition of species, habitat, ecosystems and importance of biodiversity. Emphasis is given on measuring technique, assessment and biodiversity monitoring for conservation. Current issues, national biodiversity policy, management and mechanism for biodiversity conservation are covered.
- FHM4201 Remote Sensing in Forestry** 3 (2+1)
 Prerequisite : None
 This course introduces students to basic theory on remote sensing and basic principles of satellite image processing. The teaching focuses on appropriate used image processing software. The student will be given the opportunity to analyze field data.
- FHM4202 Economic Valuation of Forest Resource and Biodiversity** 3 (2+1)
 Prerequisite : None
 This course covers the basic concepts and methods in conducting economic valuation of forest and biological resources. Emphasized are given on sustainable development, the importance of forest and biological resources, problems related to deforestation, concept and theory of utility and welfare economics, types of economic value, approaches in economic valuation, steps involved and methods of economic valuation, forest resource accounting and applications of economic valuation. Case studies in economic valuation of forest resources and biodiversity are covered.

FHM4203	International Forestry	2 (2+0)
Prerequisite : None		
This course covers status, classification of forest and current global issues related to forestry sectors. Discussion on global and national forestry organizations, and international treaty related to forest management.		
FHM4206	Carbon Measurement and Monitoring	3 (2+1)
Prerequisite : None		
This course encompasses the role of forests in climate change. International cooperation by various related agencies in reducing the impact of global climate change is discussed. Emphasized is given on methods in measurement and monitoring of carbon in the forested area.		
FHM4302	Human and Wildlife Conflicts	3 (3+0)
Prerequisite : None		
This course covers concept of conflict management and roles of human and wildlife. The understanding of ecosystem functions and carrying capacity are emphasized in evaluating human and wildlife conflicts. Mitigation methods for solving human and wildlife conflicts are emphasized.		
FHM4304	Conflict Management in Forest Plantations	3 (2+1)
Prerequisite : None		
This course covers conflict management concept, roles of human in managing forest plantations. The course focuses on human conflicts to wildlife in forest plantation. Methods for dealing with conflicts between human and forest resources and land claims issues are discussed.		
FHS4903	Industrial Training	8 (0+8)
Prerequisite : None		
In this course, students are exposed to real working environment in industries/organizations. Training includes application of the theoretical and practical aspects that have been studied with current practices in the workplace. Problem solving and communication skills are also emphasized.		
FHS4904	Forestry Camp	2 (0+2)
Prerequisite : None		
This course covers early exposure to the students on the importance of forest ecosystem towards the society and nation. Students are also trained with various forestry skills in the field, as well as developing students' character and values.		
FHS4959A/ FHS4959B	Bachelor Dissertation	6 (0+6)
Prerequisite : None		
This course covers the preparation of proposal, implementation and scientific writing of research project. Scientific approach to generate data systematically through appropriate design, data collection and analysis are emphasized		