

## **BACHELOR OF SCIENCE (DRYLAND AGRICULTURE AND ENTERPRISE DEVELOPMENT) PROGRAMME**

### **Course Description**

#### **Level 100**

#### **KCU 100: History and Development of East Africa Agriculture**

Climate and soils of East Africa; history and development of agriculture in Kenya: agricultural production systems, agriculture and the Kenyan economy; factors limiting crop and animal production in Kenya; agriculture and enterprise development: nature of entrepreneurship development in agriculture, agriculture and wealth creation, characteristics of entrepreneurs; agricultural organization and research.

#### **KCU 101: Fundamentals of Mathematics**

Basic concepts of algebra; equations and inequalities; functions; algebraic and quadratic expressions, polynomial functions, exponential and logarithmic functions, vector calculus and applications, matrices; systems of equations; linear programming; differential and integral calculus; introduction to probability and statistics.

#### **KAP 100: Introduction to Animal Production**

Definitions of animal production, husbandry, production, management and veterinary science. Animal science disciplines. The role of animal production in agriculture and the national economy. Crops versus animal production. The role of animal production in human nutrition. Animal products and national requirements. A survey of Animal production systems.

#### **KAP 103: Physiology and Anatomy of Farm Animals**

Structures, functions and regulation of the neuro-endocrine system, digestive system, reproductive system and mammary system of farm animals; mechanism of thermoregulation and adaptation; principles of farm animal health, management; Immune system and principles of vaccination; prevalent infectious diseases, parasitic infestations and causal agents; herd health management programs; notifiable diseases of animals in Kenya and health-related legislation.

#### **KRM 102: Farming Systems**

Classification of important crops in Kenya, importance to the national economy and human diet: field crops, horticultural, and plantation crops; agronomic requirements influencing crop selection; centres of crop production; farming systems and patterns in Kenya; principles and potentials of organic farming; potentials of medicinal and aromatic plants; suitable animals, principles of animal based integrated farming systems: types, components, nutrient availability, bio-resource flow, resource allocation; advantages, potential and constraints, field studies to different agricultural related enterprises.

### **KBT 100: Principles of Agribusiness Management**

### **KST 103: Fundamentals of Physics**

### **KST 104: Fundamentals of Chemistry**

### **KST 110: Introduction to Crop Protection**

### **KST 112: Basic Botany**

## **Level 200**

### **KCU 200: Statistics for Agriculture**

Concept of variability, basic principles of sampling, parameters and estimates, measures of centre and dispersion, frequency distributions; types of variables: discrete and continuous; concepts of probability: probability distributions and probability density functions; normal distributions: t and F distributions; concept of hypothesis testing: testing means, Z-test, and t-test, testing homogeneity of variance F- test, types of errors and power of the test; Studying linear relationships: simple linear regression and correlation.

### **KCU 202: Principles of Soil Science**

Introduction to soil science, soil forming factors and processes; soil components; minerals and organic matter; forms of soil aggregate; peds and pores; chemical reactions on the soil colloidal surfaces; soil aeration; drying and wetting of soil; soil physical properties; water holding capacity, bulk density, electrical conductivity and texture; soil chemical properties: pH, cation exchange capacity; bases and soil oxides; plant nutrients; soil organisms.

### **KDM 200: Dryland Ecology**

Introduction to the basic knowledge of ecology, biome concept, factors determining biomes; climate impact on dryland biome; energy flow in dryland ecosystem; concepts of edaphic population; population control; population interaction in dryland ecosystems, mortality and survival, demography; community interaction in dryland ecosystem; ecological dominance, key species; niche concept, competition between species, survivor, predation, plant defence against herbivores, chemical defence in animals, warning and protective coloration, mimicry, organisms relations

### **KDM 202: Agro – Climatology**

Scope of climatology, climate elements and factors, climate classification climate change: past, present and future, causes, impacts, mitigation and adaptation; climate modeling; public education and climate information dissemination, El Nino and La Nina phenomenon and its impacts; concepts and aspects of agroclimatology; the role of climate in agriculture trends in agroclimatic studies.

### **KDM 204: Dryland Crop Production**

Definition of Dryland, dryland farming environment, drought and crop adoption, principles of dryland farming; land preparation, crop production and management, land degradation versus crop production, classification of degradation processes, desertification processes; measures to control land degradation and restoration, dryland crop classification; wild plant communities for potential markets, genetic engineering of crops.

### **KRM 201: Agricultural Machinery**

Land suitability for agriculture; types of land development and preparations, timing of cultivation, seedbed establishment; Seeding, planting, weeding. Farm operations and performance; Machinery and farm tools; Land survey and design of foundations; Suitable farm structures for different types of uses, engineering drawings and farm structures, tillage and soil consistency, overview of machines and mechanized systems for agricultural production (field trip).

### **KRM 203: Principles of Animal Production**

Present status, existing potentials and constraints in major agro-ecological regions of Kenya for production and management of livestock, poultry and fish; classification of farm animals, characteristics of different breeds; environmental effects on farm animal production and reproduction; planning and establishing of an animal enterprise; farm survey.

### **KRM 204: Principles of Animal Breeding**

Concepts and principles; theory of quantitative traits; genetic parameters; prediction of breeding values; selection: genetic response, estimation of genetic change, multiple traits selection, marker assisted selection, construction of selection indices; mating systems: inbreeding, cross breeding; application of breeding methods to improve traits of economic importance; national and international breeding programmes, computation of predicted difference of breeding values; advances and application of biotechnology; policy, legal and institutional framework in animal breeding practice.

### **KBT 203: Agribusiness Production Economics**

### **KBT 208: Farm Management**

### **ASC 205: Rural Sociology**

### **SMR 305: Wildlife Ecology and Management**

### **SMB 303: Agricultural Microbiology**

## **Level 300**

### **KCU 300: Field Attachment (1 unit)**

The purpose of the field attachment is to expose students to actual issues and problems related to dryland agriculture resources management. The practicum will take place during the long vacation and will last for three months. It will be supervised and graded according to the university system.

### **KDM 301: Dryland Animal Nutrition and Feeding**

History of animal nutrition, animal food chain, feed sources, feed considerations; availability, composition digestibility metabolic efficiency, food intake; a biotic factor affecting feed intake; food stuffs, ration evaluation and formulation, principles of ration formulation in ruminants and non-ruminants of feeds to livestock; pasture and fodder crops, pasture conservation and utilization; small scale feed manufacturing plant.

### **KDM 303: Rangeland Resources Management**

Definition and characteristics of rangelands; importance of rangeland ecosystems; dynamics and productivity of rangelands; interrelationships of rangeland resources; resource inventory and techniques; estimation of grazing capacity; rangeland management and improvement; community based rangeland resources utilization and management; application of simulation models; case studies. (Field visits to different dryland ecosystems)

### **KDM 304: Agriculture and Environment**

Characteristics of different agricultural systems; traditional, modern, nomadism, mixed farming, ranching, intercropping, agroforestry, shifting cultivation, and improved fallows; impact of different systems on environment; current trends in the farming systems in Kenya; food security; pre-and post harvest losses; food storage and processing techniques; agricultural processing and environmental pollution.

### **KDM 305: Food Security in Drylands**

Definition of food security; chronic, transient and creeping food security; food production and domestic consumption; causes of food insecurity, coping mechanisms; impact of agricultural policy, land tenure, role of technology in food production, role of markets and infrastructure; impact of international trade systems; early warning systems in food security; food and, food aid and security safety- nets.

### **KDM 306: Water Resources and Management in Dryland**

Sources of water in drylands; demand and utilization of water resources in drylands, occurrence, distribution and inventory of water resources in drylands; causes and effects of water scarcity and degradation in drylands; water management approaches; irrigation and drainage, water harvesting and run-off control, moisture control; aspects of integrated water resources management in the drylands.

### **KRM 300: Soil Fertility and Plant Nutrition**

Definition of soil fertility; essential plant nutrients and their availability in soil; essential elements and their influence on plant growth; non-essential elements and elements toxic to plant, nutrient uptake by plant; physiological functions of essential elements in plants, their deficiency symptoms and toxicity; soil organic matter and importance of humus in soil,

microbiological transformation in the soil and nutrients cycling, types and application methods of manure and inorganic fertilizers and their fate in soil, crop response and fertilizer use recommendations.

### **KRM 306: Principles of Forage Production and Conservation**

Common grasses and legumes used as animal feed: agronomic description, establishment and management; factors affecting quantity and quality; role of legumes in pasture production; defoliation and grazing management; principles and techniques of forage conservation; estimation of yield and quality of forage.

### **KST 300: Seed Science and Technology**

### **KST 305: Plant Breeding**

### **SBT 303: Principles of Plant Pathology**

### **ESU 400: Environmental Conflicts and Peace Building**

### **BBA 310: Entrepreneurship and Small Business Development**

### **KCU 301: Research Methods**

### **Level 400**

### **KCU 400: Research Project (equivalent to 2 units) (pre-requisite KRM 405)**

All students taking the course will undertake a research project. The choice of the topic will be agreed upon by the student and supervisor in the first semester of year four. Student will be required to develop and present proposals, make oral presentation at departmental seminar. In second semester, students will analyse data, write and submit final project reports for assessment and grading.

### **KDM 401: Dryland Livestock Production Systems**

Concepts and principles, production considerations; beef and dairy production systems; free range grazing, cattle ranching management for increased production; small livestock production systems; sheep, goats rabbits, poultry; camel production systems; apiculture; non-conventional livestock production systems; livestock – wildlife integrated production systems, ostrich farming, terminates; marketing strategy for non-conventional livestock production; conflicts in development of non-conventional livestock(culture, legal policy); livestock marketing.

### **KDM 402: Animal Health and Hygiene**

Signs and importance of good health in farm animals, important tropical livestock diseases; their etiology, transmission, ecology and control measures; East Coast Fever, Brucellosis; principles of animal health management, hygiene practices in handling animals and animal products, visits to government and other disease control establishments. Laboratories and research centers.

### **KDM 403: Management of Ranching Enterprise**

Categories of ranching systems; animal management in ranching enterprises; Extensive, semi – intensive and intensive and intensive production systems; guidelines for livestock husbandry in land management; management of grazing areas; controlled grazing, rotational grazing, pasture improvement and rehabilitation; fodder production in mixed ranching systems, land management and fodder production, fodder establishment techniques; zero grazing

### **KDM 404: Apiculture Production and Marketing**

The species of honeybee and their past and present world distribution; the role of bees in agriculture; reasons for bee keeping; biology of the honeybee; breeding, disease and pests; the management of a bee colony with respect to flowering vegetation, foraging behaviour and feeding; swarm control; type of hives; harvesting handling, processing, grading and marketing of honey and wax; the honey and wax industry; special equipment recommended for Africa and European bee stocks; bee equipment; honey and wax equipment; problems encountered in commercial beekeeping in Africa: honey quality control.

### **KDM 405: Aquaculture Production and Marketing**

Fish Biology, nutrition and behaviour; introduction to aquaculture; types of aquaculture, aquaculture systems and technologies; site selection and pond construction, development and invention of new and improved aquaculture equipment and techniques, muri culture, aquaculture management; commercial aquaculture production techniques; nutrient and feeding, fertilization; harvesting, processing and marketing; public health and water borne diseases.

### **KRM 401: General Soil Management**

Soil survey and soil classification systems; Classification of dryland soils of Kenya; Soils, water and air pollution due to agricultural and other activities; Fate of pollutants in soil; Impacts of pollutants on soil, water and air quality: soil degradation and erosion, eutrophication and global warming; Pollution control; Potentials and limitations of Kenyan soils for land use planning with special emphasis on Agricultural management; managing of salt affected soils, vertisols and related types.

### **KRM 402: Conservation Agriculture and Agroforestry Management**

Characteristics of different agricultural systems: traditional, modern, nomadism, ranching, intercropping, agroforestry, shifting cultivation, and improved fallows; impact of different systems on environment; current trends in the farming systems in Kenya; food security; pre- and post harvest losses; food storage and processing techniques.

### **KBT 402: Organizational Management and Team Building**

### **KBT 420: International Trade in Agriculture**

**KST 401: Post Harvest Technology**

**KST 408: Agricultural Extension and Rural Development.**

**KST 413: Agricultural Policy and Law**