BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSIONS

1.0 INTRODUCTION

The aim of the programme is to produce trained manpower with practical knowledge and skills in agriculture, biology and education necessary for effective performance of responsibilities in the agricultural and community development sector. The skills and knowledge acquired will enable trainees communicate effectively; Demonstrate creativity and initiative in the field of agriculture and education. The School of Agriculture, Food Security and Biodiversity collaborates with the School of Education and Social Sciences and the School of Biological and Physical Sciences at Jaramogi Oginga Odinga University of Science and Technology to identify the relevant course units in biology and education in line with the Teachers Service Commission and Ministry of Education requirements.

The graduate of the programme is an all round individual with a blend of courses in agricultural sciences, education, business, agricultural and extension education, biology, and community development. It is envisaged that graduates of this degree programme will be employed either in the agricultural sector or as teachers in secondary and mid-level institutions.

2.0 OBJECTIVE

The overall objective of this programme is to prepare students to acquire intellectual, social and practical skills required in agriculture and education to provide leadership for positive change in community development.

The course will specifically prepare students to:

a) Acquire knowledge that will build competence in agricultural extension and education.
b) Use skills and knowledge acquired to efficiently deliver agricultural extension services.
c) Impart knowledge and skills in teaching agriculture and biology in secondary schools and mid-level institutions.

3.0 ADMISSION REQUIREMENTS

3.1. Kenya Certificate of Secondary Education Candidates

a) Candidates must satisfy the minimum university requirements of mean grade of C+.

b) In addition to 3.1(a) above, candidates should offer passes at C+ or above in Biology, Physics, Chemistry and Mathematics; and satisfy the Joint Admission Board's subject cluster requirements.

3.2 Other Candidates:

Admission to the degree course may also be granted to the following candidates:

a) Holders of KACE with two principal passes in science subjects and at least a credit in mathematics at Ordinary level.

b) Holders of diploma in agricultural or education related subjects from a recognized college.

c) Holders of a relevant degree from a recognized University.

d) Holders of a relevant Higher National Diploma from a recognized institution.

4.0 COURSE STRUCTURE AND DURATION

4.1 The degree shall normally take four academic years of 8 semesters.

4.2 Courses shall be offered in units. A course unit is defined as that part of a subject described by a coherent syllabus and taught normally over a period of a semester. It is designated as a total of 42 hours of study in a semester. For this purpose one 1-hour lecture is equivalent to one 2-hour tutorial or 3-hour practical or any combination as may be approved by the Board of the School of Agriculture, Food Security and Biodiversity.

4.3 Part-time students shall be allowed to take not less than 50% of the courses prescribed for the year.

4.4 All courses will be taught for a total of 42 contact hours, including examinations except Teaching Practice which will be undertaken for the durations when schools are in session followed by Farm Practice for 480 hours of practical work in a relevant agro-based enterprise or organization.

4.5. Students shall be required to undertake teaching practice of a whole school term of 3 months during the 2nd semester of the third year of study. This will be followed by an approved 12 week farm practice over the long University recess.

4.6 In the second semester of the 4th year, each student will be required to carry out an approved special project.

5.0 MODE OF COURSE DELIVERY

5.1 There shall be regular courses offered through Lectures, tutorials and practical and part time courses offered through Open and Distance Learning arrangements.

5.2 For part-time students, the following shall be applicable:

a) The main medium of instruction will be print and electronic correspondence.

b) The course content for each subject shall be provided in study units. Each study unit shall cover content equivalent to forty two, one hour lectures.

c) There shall be supplementary mode of delivery in the form of lectures, library services and practical/discussion/revision sessions.

d) The lectures shall include residential sessions and weekend sessions at designated Agricultural Institutions.

e) Laboratory work will be conducted on campus.

f) Any necessary tutoring, counseling, and guidance shall be provided in modes considered suitable by the School of Agriculture, Food Security and Biodiversity.

g) Provision of learner support services and material production storage and distribution shall be the responsibility of the Centre for Open and Distance Learning (CODL) in collaboration with the School of Agriculture, Food Security and Biodiversity.

6.0 EXEMPTION FROM COURSES

Students may be exempted from some courses by Senate on recommendation of the School Board.

7.0 EXAMINATIONS REGULATIONS

University Senate Examinations rules and regulations shall apply.

8.0 REGULATIONS FOR TEACHING AND FARM PRACTICE

8.1 Teaching Practice

a) Teaching and Farm Practice shall be mandatory for all students in this degree program.
b) Students shall be required to undertake teaching and farm practice for a period equivalent to one semester during their third year of study. The period for teaching practice shall coincide with a full school term followed by a 12 week farm practice.
c) For a student to pass teaching practice, he or she will have taught continuously during the teaching practice period.
d) Teaching practice shall be equivalent to two units, one each for Agriculture and Biology.
e) Each student on Teaching Practice shall be assessed three times during the teaching practice for each of the teaching subjects.
f) Each assessment shall be marked out of one hundred (100).
g) The pass mark in each unit shall be 40%.
h) Teaching Practice will be the responsibility of the School of Education.
i) Students who pass in teaching practice units but repeat the year shall carry forward their grades in those units.
j) Students who fail to attain pass mark in any teaching practice unit shall do supplementary teaching practice within three months after completion of their final year.
k) Students who fail to do teaching practice on acceptable grounds shall do special teaching practice within three months after completion of their final year.

8.2 Farm Practice

a) Identification of farms or agro-based enterprises cum organizations for student attachment shall be done by the students and approved by the School of Agriculture, Food Security and Biodiversity.
b) Assessment of students during farm practice/field attachment shall be done by the School of Agriculture, Food Security and Biodiversity, while the farms/organizations will be responsible for daily supervision.

c) During the farm practice attachment, the students are expected to familiarize themselves with all aspects of enterprises on the farm. They will also be expected to keep a diary of activities accomplished over the duration of the farm practice.

d) Students who fail to undertake farm practice on acceptable grounds shall undertake special farm practice within three months after completion of their final year.

9.0 COURSE DISTRIBUTION

YEAR 1: Semester 1

Course Code	Course Title	Contact Hours		Total Contact Hours	Weight (Unit)
		Lecture	Practical		
EEL 3115	Communication Skills	42	0	42	1R
AAE 3111	Fundamentals of Agricultural Development	42	0	42	1C
SCH 3111	Physical Chemistry	28	14	42	1R
SMA 3111	Mathematics I	42	0	42	1R
AEE 3111	Philosophy of Extension Education	42	0	42	1C
SBI 3114	HIV/AIDS	28	14	42	1R
APT 3114	Introduction to Agriculture	28	14	42	1C
SCS 3111	Computer Organization and Applications	28	14	42	1R
	Total	**280**	**56**	**336**	**8**

Year 1 Semester 2

Course Code	Course Title	Contact Hours		Total Contact Hours	Weight (Unit)
		Lecture	Practical		

BEN 3121	Principles of Microeconomics	42	0	42	1C
AAB 121	Agricultural Microbiology	28	14	42	1C
ERP 3120	Social Ethics and Integrity	28	14	42	1R
AEE 3121	Introduction to Community Development	28	14	42	1C
APT 3125	Principles of Crop Production	28	14	42	1C
ALS 3123	Introduction to Soil Science	28	14	42	1C
SLB 3121	Development Studies	42	0	42	1R
SCS 3123	Fundamentals of Programming	28	14	42	1R
	Total	**252**	**84**	**336**	8

Year 2 Semesters 1

Course Code	Course Title	Contact Hours		Total Contact Hours	Weight (Unit)
		Lecture	Practical		
PSY 3211	Psychology of Learning and Teaching	42	0	42	1C
SBI 3214	Economic Botany	28	14	42	1C
AAB 217	Molecular Cell Biology	28	14	42	1C
BEN 3213	Principles of Macroeconomics	42	0	42	1R
AEE 3211	Extension Approaches & Methods	42	0	42	1C
APT 3216	Principles of Plant Pathology	28	14	42	1C
AAS 3217	Principles of Genetics	28	14	42	1R
	Total	**238**	**56**	**294**	**7**

Year 2 Semester 2

Course Code	Course Title	Contact Hours		Total Contact Hours	Weight (Unit)
		Lecture	Practical		
ALS 3221	Soil and Water Conservation	28	14	42	1C
AAS 3221	Principles of Animal Production	28	14	42	1C
APT 3224	Plant Physiology	28	14	42	1C
ECT 3212	Curriculum Development	28	14	42	1C
AAS 3222	Livestock Production Systems	42	0	42	1R
AEE 3221	Subject Methods in Agriculture	28	14	42	1C
BEN 3225	Production Economics	42	0	42	1R
AEE 3222	Rural Sociology and Community Development	42	0	42	1C
	Total	**266**	**70**	**336**	**8**

Year 3 Semester 1

Course Code	Course Title	Contact Hours		Total Contact Hours	Weight (Unit)
		Lecture	Practical		
SBI 3312	Biostatistics I	28	0	42	1C
EPY 3312	Psychology of Human Development	42	0	42	1R
APT 3311	Pastures and Fodder Crops	28	14	42	1C
AEE 3311	Farm/Firm Accounts and Planning	42	0	42	1C
AEE 3312	Agricultural Marketing and Livestock Economics	42	0	42	1C
SES 3311	Farm Mechanization	28	14	42	1R
ECT 3360	Educational Technology	28	14	42	1R
ECT 3332	Subject Methods in Biology	28	14	42	1C
	Total	**280**	**56**	**336**	**8**

Year 3 Semester 2

Course Code	Course Title	Contact Hours		Total Contact Hours	Weight (Unit)
		Lecture	Practical		
SBI 3326	Biostatistics I	28	14	42	1R
ERP 3321	Sociology of Education	42	0	42	1C
AAS 3321	Parasitology	28	14	42	1R
AEE 3321	Agricultural Extension and Technology Transfer	42	0	42	1C
AEE 3322	Communication Methods and Media in Agriculture	42	0	42	1C
AEE 3323	Leadership Development and Practices in Agriculture	42	0	42	1C
ERP 3322	Philosophy of Teaching	42	0	42	1C
	Total	**266**	**28**	**294**	**7**

Year 3 Semester 3 Teaching Practice 12 weeks; Farm Practice Attachment 12 weeks between Year 3 and 4

Course Code	Course Title	Contact Hours		Total Contact Hours	Weight (Unit)
		Lecture	Practical		
AAE 3331	Teaching Practice	0	42	42	1C
AAE 3332	Farm Practice Attachment	0	42	42	1C
	Total	**0**	**84**	**84**	**2**

Year 4 Semester 1

Course Code	Course Title	Contact Hours		Total Contact Hours	Weight (Unit)
		Lecture	Practical		
AAE 3416	Community Health and Food Security	28	14	42	1C
AAE 3417	Environmental and Socio-Economic Impact Assessment	42	14	42	1C
PSY 3410	Education Tests and Measurements and Evaluation	28	14	42	1C
APT 3413	Horticultural Production	28	14	42	1R
PAC 3412	Planning and Economics of Educational	28	14	42	1R
AHT 4414	Nuts, Beverages and Medicinal plants	28	14	42	1R
AAS 3416	Animal Breeding	28	14	42	1C
AAE 3422	Special Project I	28	14	42	1C
	Total	**266**	**112**	**336**	**8**

Year 4 Semester 2

Course Code	Course Title	Contact Hours		Total Contact Hours	Weight (Unit)
		Lecture	Practical		
AAE 3421	Agricultural Law and Institutional Analysis	28	0	42	1C

AEE 3421	Extension Education Evaluation	42	0	42	1C
EDF 3421	Philosophy of Learning and Teaching	42	0	42	1C
PAC 3421	Education Administration and Management	42	0	42	1R
AAE 3425	Environmental and Natural Resource Economics	42	0	42	1C
AAE 3427	Farm Management	42	0	42	1R
AEE 3422	Special Projects II	28	14	42	1C
	Total	**280**	**14**	**294**	**7**

9.0 DESCRIPTION OF THE UNITS

Year 1 Semester 1

AEN 3115: **Communication Skills** **42 Hours**

Study skills; Planning study time, making references, filing notes; Preparing for examinations. Library Skills: Organization; Classification, shelving; using reference books, listening in lectures, speeches and instructions, understanding lectures, note taking, speaking skills, asking and answering questions in lectures and seminars, making and defending arguments, agreeing and disagreeing, explaining points clearly, academic reading skills, skimming and scanning, understanding footnotes and bibliographical references.

AAE 3111 Fundamentals of Development in Agribusiness 42 Hours

An overview of the theories of agribusiness development; The relationship between socio-economic development and Agribusiness; Modernization and economic growth in agribusiness; Innovation systems and novelty in agribusiness development; The importance of economic and social institutions in agribusiness development; Ethics and values in agribusiness development; The role of government in agribusiness development, power, authority and forms of government; Public procurement: Trends in policy development, preferences and reservations, best practices, guidelines;

government and its organ: Legislature, executive and judiciary; Political parties; Participation of Small and Micro-Enterprises in public procurement and overall economic developments.

SCH 3111 Physical Chemistry **42 Hours**

The structure and properties of matter, origin of elements, evolution of living organisms from chemical systems, bond formation and molecules. Laws of thermodynamics, Steady state kinetics, Reaction kinetics, various functional groups of organic molecules and their biological roles. Carbohydrates ;Structure and properties of mono-, di- and polysaccharides

SMA 3111Mathematics I **42 Hours**

Elementary set theory; Mappings and functions: Definitions, domains, co-domains, range and inverses and composition of functions**;** Trigonometry; Functions: their graphs, inverses, degree and radian measure, sine and cosine formulae, trigonometric identities and equations. Algebra: Quadratic equations. Surds, logarithms and indices. Series: Arithmetic and geometric progressions, Permutation and combinations. Binomial theorem and applications such as approximations, simple and compound interest. Remainder theorem applications to solutions of factorizable polynomials. Statistics: Collection and representation of data. Measures of central tendencies and variability. Graphical and axiomatic approaches to probabilities. Tree diagrams. Probability: Definition, axioms, tree diagram.

AAE 3114 Philosophy of Extension Education **42 Hours**

Extension service functions- information, Educational delivery and problem solving. Why we need Agricultural and extension Education. Why we have extension service? Extension principles, philosophy for vocational agriculture, planned programs.

Definition strategies in technology generation transfer to developing countries (Basic needs strategy, Top/Down-trickle down strategies, appropriate/ intermediate technology strategy, multinationals strategies); Extension approaches (i.e. individual, group, integrated-package, special commodity, Farming systems, training and visits, Community development, PRA).

SBI 3114 HIV and AIDS **42 Hours**

Historical background and magnitude of HIV/AIDS; Biological replication of the virus; Rapid tests: Elisa, CD4 and viral load counts; HIV/AIDS risk factors and transmission; Factors enhancing spread of HIV/AIDS; Opportunistic infections; Voluntary counseling and testing (VCT); Abstinence; Be faithful and use condoms (ABC); Peer education for HIV/AIDS; Collaboration and Networking for HIV/AIDS; Socio-cultural, socio-economic and religious impacts of HIV/AIDS; Information education and communication (IEC); Counseling and spiritual car; Myths and emerging issues on HIV/AIDS.

APT 3114 Introduction to Agriculture **42 Hours**

Agricultural industry; Agriculture and its contribution to development; Opportunities for agro-industries; Employment opportunities in agriculture; Land resource: climate and agriculture, soils and agriculture; Cropping systems; Biotechnology in agriculture: Tissue culture and genetic engineering; Harvesting and post-harvesting handling; Agricultural marketing; Classification of animal genetic resources (AnGR); Livestock production systems; Animal breeding, nutrition and management; Non-conventional species; Fish farming and production; Farm power and machinery; Processing and storage of agricultural products; introduction to agricultural product value chains

SCS 3111 Computer Organization and Applications **42 Hours**

Organization: Introduction to the computer and the notion of a programmable machine. The basic organization based on the von Neumann model. Functional components (CPU, memory, I/O) and their logical organization. Number systems and internal data representation. Concept software and types of software. Components of contemporary personal computer systems from end-user perspective; Application: Classical and contemporary applications of computers. Proficiency in basic computer usage and productivity/office automation applications including word-processing, spreadsheets, e-mail, web, etc. Basic first Year security and maintenance issues. Ethical and societal issues.

Year 1 Semester 2

AAE 3121 Principles of Microeconomics **42 Hours**

Basic concepts of economics applied to agriculture with special reference to Kenya; Economic systems; Scarcity, choice and opportunity costs; The price theory; Demand and supply; Elements of utility; Demand and basic concepts of elasticity; Economics of production including production functions and costs of production; Market structure; Theory of distribution and factor markets; The price system and economic role of government.

AAB 3121: Agricultural Microbiology 42 hours

History of Microbiology: Spontaneous generation theory; Role of microbes in fermentation; Germ theory of disease; Protection against infections; Applied areas of Microbiology; Metabolism in bacteria;Bacteriophages, structure and properties of Bacterial viruses – Lytic and Lysogenic cycles: viroids, prions; Microbial groups in soil, microbial transformations of carbon, nitrogen, phosphorus and sulphur, Biological nitrogen fixation;Microflora of Rhizosphere and Phyllosphere; Microbes in composting; Microbiology of food, microbial spoilage and principles of food preservation; Beneficial microorganisms in Agriculture -Biofertilizer (Bacterial,Cyanobacterial and Fungal), Microbial Insecticides, Microbial agents for control of Plant diseases; Biodegradation, Biogas production, Biodegradable plastics; Plant-Microbe interactions.

ERP 3120 Social Ethics and Integrity 42 Hours

Introduction: Concepts of ethics and its relationship with sociology and psychology; Ethics as a philosophical discipline; Natural law; Norms of African societies; Customary law; Basic principles of morality; The human person as the author of behaviour; The morality of human acts, human conscience, freedom and choice; The problem of evil. Application of ethics and integrity at work. Definitions and concepts of ethics; Categories of ethics; National cohesion; Integrity; Unity; Structural injustices; Ethnicity; Positive ethnicity; Peace: Peace making, peace building, peace transformation,; Stakeholders in National Cohesion; Ethics, integrity and national building.

AEE 3121 Introduction to Community Development 42 Hours

Introduction; community development; economic development; The relationship between community and economic development; Who practices community development; Theories for

community developers; Why theory; Key Corners in community development field; Assets-based community development; Needs based community development; Challenges of the community development process; Social Capital and Community development; Community Social CAPITAL; How does Community Social Capital influence development; Factors that influence the success of community building efforts; Community development practices, first step – defining the community, Practicing community development, community development principles of practice, The community development process; How does community development practice relate to community development? What do Community developers do? Professional Standards of ethical practices

APT 3125 Principles of Crop Production 42 Hours

Concept of crop production, energy/biomes transfer systems; Environmental factors determining crop performance; Cultural practices: seedbed preparation, cultivation, plant seed and seed rates, plant population; Crop protection; Maintenance of soil fertility: organic and inorganic fertilizers; soil and water conservation; Cropping systems including crop rotation; Intercropping and agro-forestry

SLB 3121 Development Studies 42 Hours

Development Studies as an autonomous discipline; The concept of development; An overview of the theories and paradigms of development; The relationship between economic growth and development; Science and technology in development; Developed and developing countries; Issues in development: social, economic and political; actors in development: the state, national and international NGOs, bilateral and multilateral institutions, multinational corporations (MNCs), and social movements

SCS 3123 Fundamentals of Programming 42 Hours

Introduction to computer programming**:** High-Year and Low-Year Languages, Generations of Programming Languages; Program writing tools: Editors; Language translators: Assemblers, Compilers, Interpreters (Only concept and differences), Source code, Object code, Executable file and extensions of the different files, Running of a Program; Structured program design: Top-down design, Flow charts: Definitions and Symbols used to draw flowcharts; Coding, Testing and

evaluation of programs. Procedural Programming: Structure of a procedural Program; Data types and expressions; Control structures; Arrays; Records /structures; Functions; Procedures; Advanced features: Files; Library procedures; Graphical User Interfaces.

Year 2 Semester 1

PSY 3211 Psychology of Learning and Teaching 42 Hours

Introduction to learning. Learning in Educational Psychology. The Teaching/Learning process and Psychology. Theories of Learning: Behaviorism, Cognitive Theories, Social Learning, Humanistic and Constructivist Views. Situated Cognition. Learning and Classroom Practice. Brain-based Learning. Experiential Learning: Learning Styles. Essentials of Learning: Motivation, Attitudes, Problem solving, Creativity and Transfer of Learning. Emotional Intelligence. Teachers and Educational Psychology: Experts vs. Novices. Learner/Teacher Communicative Competence. Meaningful Learning and Teaching: Academic Learning vs Skills Acquisition. Teaching Models: Identification and Evaluation of Theoretical Premise. Teacher roles in Classroom Management, Student Adjustment, School organization, Curriculum and Attitude Change. Information Technology in the Classroom: Computer Assisted Learning, Tutorials and Drills. Connectionism and Simulation of Cognitive Processes. Exceptional Learners. Research in Pedagogy. Contemporary Issues in Learning and Teaching.

SBI 3214: Economic Botany **42 Hours**

Plants useful to man, introduction to the major exotic and indigenous crops plants, reproduction, angiosperms, origin of major crop plants in Kenya, potential of plant Kingdom for new economic species, weed and their control. Introduction to the biology of fungi, bacteria and viruses in relation to plant pathology.

AAB 3217: Molecular Cell Biology **42 hours**

Cellular organizations; Cell metabolism and energetics; Cell surface & cytoplasmic organelles; Phenotype, genes and alleles; Chromosomes and the cell cycle; Properties of DNA; Recombination. Genetic engineering; The basic concept of DNA cloning; DNA cloning vectors; DNA repair; Mutation and mutagenesis; DNA sequencing; Techniques for isolation and characterization of proteins; column chromatography;electrophoresis; blots; Cells and tissues of the immune system; immunological reactions to infections; genetic basis of antibody production; vaccines and immunity; Immunochemical techniques.

BEN 3213 Principles of Macroeconomics **42 Hours**

Elements of economics applied to the economy as a whole with emphasis on monetary and fiscal policy problems: National income accounting, determinants of national income, fiscal policies, introduction to international economics and economic growth

AAE 3215 Extension Approaches and Methods **42 Hours**

Meaning of Agricultural Extension; Basic principles of Extension; Surveys for Extension; Extension teaching methods; Local leaders and farmers organizations; Spread of Extension packages through groups, training etc; Development of agricultural education in Kenya. Objectives of teaching agriculture in primary, secondary, and tertiary institutions. Prospects and problems of agriculture. Responsibilities of agriculture teachers. Resources for teaching agriculture. The establishment and use of school farm and agricultural workshop. Preparing schemes of work, lesson plans. Variety of methods and materials for lesson presentation. Gender and communication patterns in an agriculture classroom: micro-teaching, mass, group, individual and visual aids methods.

APT 3216 Principles of Plant Pathology 42 Hours

Importance of Plant pathology; concepts and definitions of, nature, cause and control of plant diseases; Agents of infectious and non-infectious diseases; Inoculums and Inoculums potential; Vectors and causative agents of infectious diseases with special reference to fungi, bacteria and viruses; Non-infectious diseases; Stages in disease development, inoculation, infectious, pathogenesis and symptoms; Disease severity and assessment; Epidemiology.

Effects of environmental factors on plant diseases, toxins and plant disease; Disease resistance in plants' genetics of host plant interactions physiology of diseased plants; Control of plant diseases and chemicals used.

AAS 3217 Principles of genetics 42 Hours

Chromosomes, mitosis, meiosis; Mendelian principles and interaction of genes. Linkage, crossing over and mapping, DNA structure and replications. Sex determination and sex linkage. Multiple alleles, cytoplasmic inheritance, variations in chromosome structure and number. Mutations, recombination. Genetic engineering; polygenic inheritance. Hardy Weinberg equilibrium.

Year 2 Semester 2

ALS 3221: Soil and Water Conservation 42 Hours

Soil/water resources, historical erosions and sediment problems, geologic vs. accelerated erosion, erosion prediction equations, government conservation programs and water conservation; Water harvesting techniques; Irrigation, drainage and salinity; Storm-water management; Case studies in erosion and sedimentation.

AAS 3221 Principles of Animal Production 42 Hours

Animal industries in Kenya; animal production and its contribution to the economy; Animal production systems as affected by ecological factors; Ecological definitions and concepts in relation to animal production systems and their management; Structure, function and ecology of animal production systems; Basic principles of the management of agricultural ecosystems; The Kenya environment; Major characteristics of the ecological zones of Kenya and effects on animal production; Animal environment and livestock structures; Aspects of livestock design;

Economics of controlled environment; Animal growth and development of various organs; Tissues and fibers; Variation of growth and development of the body.

AHT 3221 Plant Physiology **42 Hours**

Physical and chemical properties of aqueous solutions and colloidal systems; Plant physiological process; Osmosis, guttation, water absorption, transpiration, translocation and associated gradients; Water potential concept; Photosynthesis: Structure and function of chloroplast, light and dark reaction, photosynthetic pathways, photorespiration; Cellular respiration: Overview, glycolysis, pyruvate decarboxylation, tricarboxylic acid cycle, electron transport chain and oxidative phosphorylation, Pentose ohosphate pathway; Stress physiology and stress tolerance mechanisms; physiology of cultural and genetic limits to crop production.

ERP 3212 Curriculum development **42 Hours**

Broad definitions of curriculum. Emerging concepts of curriculum development. The school and curriculum in developing countries. Basic principles of curriculum construction. Types of curriculum designs. Relation of agricultural development objectives to curricular plans, instructional strategies and style of learning and teaching. Curriculum implementation. Dynamics of curriculum.. Schools' and agricultural institutions' curriculum. Agricultural education and curriculum evaluation. The role of agricultural extension agents in curriculum development.

AAS 3222 Livestock Production Systems **42 Hours**

Role of livestock production in the Kenyan economy; Poultry industry and production systems; Dairy industry and production systems; Beef industry and production systems; Other production systems: camel, goat, sheep, rabbit, fish and bee- keeping; Handling, preservation and processing of animal products: wool, hides, skins, meat, milk, and eggs.

AAE 3224 Subject methods in Agriculture 42 Hours

Concepts of agriculture and agricultural education. The scope of agriculture syllabi in secondary schools. Relating agricultural education objectives to the national education goals. Schemes of work. Lesson plans. Methods of teaching agriculture. Skills for learning agriculture: observation, recording, synthesizing, interpreting farming systems and rural livelihoods. Resources and facilities for teaching agriculture: the use of the environment, the agricultural farms and greenhouses. Trends in teaching agriculture. Measurement, evaluation and feedback. Records keeping.

BEN 3225 Production Economics 42 Hours

Production Economics: Meaning, Nature and Scope; Objectives; Framework of Analysis; Production functions and profit maximization: Concept of a production function, factor-product relationships, three stages of production functions; The law of diminishing marginal returns; Optimum level of input use; Production function and technological change; Costs and returns; Analysis and optimum production size; Cost concept; Categories of costs; cost function; Optimum production size; Principle of profit maximization; Principle of minimum loss; Factor and product price changes and production decisions; Factor-factor Relationships: determination of optimum combination of resources; Economies of size and their implications for firms; Product-product relationships: various relationships among products; Determination of optimum combination of products; Decision making under risk and uncertainty: decision making with less than perfect information; Reducing risk and uncertainty; The role of government in reducing risk and uncertainty.

AAE 3225 Rural sociology and community development 42 Hours

Basic sociology concepts [social groups, social status and roles social norms]; social stratification and leadership; Agricultural Development Approaches; sociological approach to Agricultural technologies; Peasant Societies and change in customary society; social groups, organization, institutions, social processes and social change in rural societies. Diffusion/ adoption processes. Gender and Development; Women Empowerment; Community Development Methodologies, Factors influencing performance of community development, Case studies of the practice of community Development in Africa, Models of community

development. Evolution of Rural Sociology in Kenya, Rural Sociology links with Extension; Community and Rural Development; Application of sociological theories in Agricultural Extension Rural/Urban migration, Influence of urbanization on rural communities. Gender relations, Women in extension; Management of Natural resources by women; planned/unplanned change strategies

Year 3 Semester 1

EPY 3312 Psychology of Human Development 42 Hours

Introduction. Issues and domains of human development. Research methods. Theories of human development: Darwin's Evolutionary theory, Sigmund Freud's Psychoanalytic theory, Erickson's Theory of psychosocial development, Piaget's theory, Humanistic theory, Learning and Behavioral Theories, Vygotsky. Prenatal development. Birth and infancy. Early childhood. Middle childhood. Late childhood. Adolescence. Early Adulthood. Middle Adulthood. Old Age. Death. Developmental Tasks and Education.

APT 3311 Pastures and fodder production 42 Hours

Natural grasslands and contribution of grassland to man; sown pastures, systems of movement, relative productivity, and efficiency of resource use. Structure and physiology of forage plants: grass and legume anatomy, morphology and photosynthesis; nutrient uptake, legume bacteriology, soil fertility, fertilizer use, nutrient cycling in grazed pastures. Species and varieties of pastures plant; grass and legume selection and breeding; seed production. Pasture establishment. Management of established pastures. Pasture renovation, conservation of excess pasture as hay and silage.

Some common pasture grasses and legumes in East Africa. Pasture seed production. Pasture breeding in East Africa. Fodder crops for domestic animals; Agro forestry practices in cropland and with structural conservation measures, in-between places. Tools for agro forestry research and Extension in pastures and Rangelands. Transfer of Dry land Technology to farmers by Extension Agents [Hedgerows for mulching, Alley cropping, on-farm live fencing multipurpose trees, fruits trees, cut-and-carry] Nursery; participatory planning for Agro forestry process, methods and Extension; sociology issues in Agro forestry technologies; Social-Economic issues

[Time Considerations, Immediate income generation, labour input requirements, social benefits, taboos and attitude].

AAE 3313 Farm Accounts and Planning 42 Hours

Farm planning techniques for a manager to control and monitor the firm business; data management, their use, collection, recording and analysis. Problems/difficulties in keeping farm and firm records. Designing and presenting firm accounting systems, including accounting methods and components of firm accounting systems. Firm business; activities of firm business analysis; the balance sheet; the income statement; analysis of the net firm income and returns to capital; labour; management and equity; enterprise budgeting; partial budgeting; complete budgeting and cash flow budgeting. Management functions; Farm accounting; Labour management; Work study; Investment and financing; partial investment calculations; modules of simultaneous investment calculations; farming under risk and uncertainty; modules to incorporate risk and uncertainty into farm planning e.g. Linear programming.

AAE 3314 Agricultural marketing and livestock Economic 42 Hours

The scope of the marketing problem in rural Kenya; marketing organization distribution channels and marketing structure in Kenya; traditional food and fiber market system and market development; small farmers in traditional marketing system and their problems; marketing alternatives for small farmers in rural Kenya; Livestock production areas and health service population, meat, milk production and marketing and maximization of returns from limited resources. Livestock policies and constraints affecting livestock development. Fodder; cattle and beef exports, processing price policies;

Marketing Research, Advertising and sales management of agricultural goods and services. Business information and forecasting methods, promotion as a system, the sales force. physical distribution of agricultural commodities. Short, medium and Long term marketing strategies of Agricultural goods and Services. The Market Plan: activities, costs, duration.

SES 3311 Farm Mechanization 42 Hours

Ploughs, seed drills and reapers; human and animal draught technologies; four wheel and crawler tractors; farm machinery for tillage, planting, cultivation, harvesting; hand tools (spade, fork,

rakes, hoes, trowels, shears, secateurs); disk harrow, plow, moldboard; grain drill row crop planter; field chopper; hay baler; mowers; horticultural hand tools; fertilizer distributors and seed drills; nursery machines; sprayers; lawn care equipment; chain saws and hedge cutters; equipment for threshing, drying; soil preparation, milking, dusting, livestock feeding, handling and housing, fruit picking, feed mixing, loading and material handling. Sources of power: wind, rotor wind machines, water, animal pumping systems, electrical generating systems

ECT 3360: Education Technology 42 Hours

The unit is divided into two parts, both of which are practical activities for students in teaching and production of resource materials; The first part covers Educational media practicals: How to use the chalkboard, graphics, construction of three dimensional materials, operation of audio-visual equipment preparation of audio-visual programmes. The second part covers microteaching: Preparation of lessons, audio-visual media for lessons; Lesson presentation; Skills application-set induction, lecturing, reinforcement, stimulus variation questioning, providing for lerner participation, feedback and closure.

ECT 3322 Subject methods in Biology 42 Hours

Concepts of biology and agricultural education. The scope of biology syllabi in secondary schools. Relating biological education objectives to the national education goals. Schemes of work. Lesson plans. Methods of teaching biology. Skills for learning biology: observation, recording, synthesizing, interpreting biological specimens and equipment. The biological lab and Laboratory experiments. Resources and facilities for teaching biology: the use of the environment, the botanical farms and gardens. Trends in teaching biology. Measurement, evaluation and feedback. Records keeping. Instructional methods in biology, planning for biology instruction, School biology curriculum, classroom management strategies; teaching media and resources, scientific language laboratory management. General design and organization of the laboratory, storage of chemicals, specimen and equipment. Improvisation of biology equipment, preparation of reagents and solutions, laboratory safety, sources of hazards, fires and their control; disposal of waste, dangerous experiments and chemicals. Legal concerns on student safety during biology instruction.

Year 3 Semester 2

SBI 3326: Biostatistics I 42 Hours

Introduction to Basic concepts; notation, tables and charts and Organisation of Data. Measures of location: Mean

ERP 3321 Sociology of education 42 Hours

Sociological foundations of education. History , scope and methods of sociology of education. The relation between sociology and the other social sciences. Main sociological theories and their relevance in education. Meaning, roles, origin, development and relevance of sociology of education. Relationship between education and society. Education, social mobility and social stratification. Education and social change. Socialization and agencies of socialization. Education and the transmission of culture. Political religious, social and economic factors which affect education in society. School as a social organization. Social problems and Education, Teaching as a profession, Education and development, gender and education, equal opportunities in education, globalization and education. Education, Social mobility, social stratification.

AAS 3321: Parasitology 45 Hours

Introduction to parasitology, classification of important animal parasites (arthropods, protozoa and helmiths), and hosts/parasites relationships. Morphology, identification and life cycles of parasites. Economic importance of parasites including pathogenesis, clinical signs, diagnosis, treatment and control.

AEE 3321: Agricultural Extension and Technology Transfer

Aims and purposes of agricultural extension; evolution of extension education to agricultural extension; principles of agricultural extension; basic concepts; justification for agricultural extension education in the developing countries; the communication process in agricultural extension; relevance of adult education in agricultural extension; adoption and diffusion of innovations; production of communication materials. globalization, liberalization and the changing demands and role for agricultural extension; new horizons and extension modalities for research-extension-farmer-market-civil society linkages; information and communication opportunities for technology transfer and linkages; gender dimensions in agricultural extension and technology development and transfer; and policy, institutional and human resources development.

AEE 3322 Communication Methods and Media in Agriculture 42 Hours

Mass media techniques for reporting and promoting extension and related programs, including message preparation, presentation, and strategy development. Philosophical and psychological implication of the use of audiovisual media in teaching. Location, selection, and evaluation of the audiovisual material for teaching purposes. Planning, designing and preparation of audiovisual material to teach vocational agriculture. Practice in the operation and management of audiovisual equipment and a media center.

AEE 3323 Leadership Development and Practices in Agriculture 42 Hours

Designed to assist students in developing a knowledge and understanding of leadership theory and basic skills required to perform effectively in leadership positions within agricultural community situations. This course explores historical and contemporary leadership theories, models and perspectives within social, cross-cultural, and political and global contexts; Philosophical and theoretical framework of leadership; Leadership effectiveness and its relationship to issues of power, influence, persuasion, motivation and ethical decision-making. Leadership competencies that address problems and seeking solutions in public and private domains. **L**eader role as it relates to issues of purpose, social responsibility, political influences, and legal constraints; Develop greater sensitivity to the variety of factors and forces impacting

leadership processes and to acquire an increased understanding of key elements of successful leadership practices.

SES 3311 Farm Mechanization 42 Hours

Ploughs, seed drills and reapers; human and animal draught technologies; four wheel and crawler tractors; farm machinery for tillage, planting, cultivation, harvesting; hand tools (spade, fork, rakes, hoes, trowels, shears, secateurs); disk harrow, plow, moldboard; grain drill row crop planter; field chopper; hay baler; mowers; horticultural hand tools; fertilizer distributors and seed drills; nursery machines; sprayers; lawn care equipment; chain saws and hedge cutters; equipment for threshing, drying; soil preparation, milking, dusting, livestock feeding, handling and housing, fruit picking, feed mixing, loading and material handling. Sources of power: wind, rotor wind machines, water, animal pumping systems, electrical generating systems

Year 3 Semester 3

AEE 3331 Teaching Practice 480 Hours

Teaching practice consists of two units covered over a period of one School term. The period of teaching practice shall coincide with a full school term.

Preparation: Schemes of work, Lesson Plans and Teaching Media. Classroom teaching. Tests and marking Schemes. Records of work. Class organization and management. Participation in School activities. Each student on teaching practice shall be assessed a minimum of three times for each of the teaching subjects. Each assessment shall be marked out of one hundred (100). The pass mark in each unit shall be 40%.

AEE 3332 Agricultural Extension Farm Practice Attachment 480 Hours

Agricultural Extension Farm Practice Attachment will be undertaken at the end of the 2nd Semester of the 3rdYear of study for twelve (12) weeks. Students will be examined in three stages as follows: Field supervision by academic staff of work undertaken by the student while on the industrial attachment (25%); oral presentation by the student upon return to the college on completion of the attachment (25%); and a written Report on the operation of the firm following the standard university report writing format (50%). The report should cover a theoretical

background and identify a problem, causes, effects, and possible solutions and opportunities created on implementation of the intervention(s).

Year 4 Semester 1

AAE 3416: Community Health and Food Security 42 Hours

The modules covered in the course are: Problem Based Learning; Introduction to Community Health; Community Based Health Care; Applied Epidemiology; Research Methodology; Behavioral Sciences and Health; Family Health and Nutrition; Environmental Health and Occupational Health; Health Service Management; Disaster Management; Historical developments that led to community food security as a public health issue; Emergence of the connection between health outcomes and systemic factors; Current circumstances that provoke new thinking about public health strategies for community food security; A proliferation of organizations and information from outside public health that address similar concerns about the food system; Community food security work.

PSY 3410 Educational Tests and Measurements 42 Hours

Introduction: History, origins and trends in education assessment; testing, purpose, terminologies, and testing policies. Attributes of measures: Testing cognition, social, intellectual and affective thought. Norm Referencing and Criterion testing: Reliability and Validity. Test development and Construction. Models of classroom measurement; test objectives, taxonomy of education objectives; designing test Blue Prints. Student assessment techniques; Aptitude and special ability Tests; IQ Tests; Individual and group tests; item analysis: Item difficulty and discrimination analysis. Debriefing and evaluation. Assembling and Administering Tests. Marking: marking schemes, marking systems, and types of scores. Statistical Measures in Testing: Classical test theory, systematic errors, interpretation of score profiles, Achievement profiles, cut off scores, test length applications. Statistical interpretation of test data: frequency distribution, range, standard deviation, normal distribution, converted scores, z-scores, t-scores, correlation, basic inferential statistical approaches. The Kenyan Examination System Policy: classroom and public national examinations, issues and implications. Contemporary issues. Gender Issues in Testing.

AAE 417: Environmental and Socio-Economic Impact Assessment 42 Hours

Overview of environmental impact assessment; Environmental compartments and dynamics; Methodologies of assessing socio-economic impacts and environmental standards; Resource interactions; The assessment process; The physical environment: Aquatic terrestrial and wetland resources; Special issues on physical environment; Modeling techniques; Hazard analysis; The social environment: Overview of components and dynamics, personal and interpersonal impacts, impacts on public health and safety, economic impact and cultural impact; Managing the assessment effort; Chemical hazard and risk assessment; Cumulative impacts of projects over regions and over time; Mitigation options; Case studies: irrigation, hydro power generation and industrialization; Role of environmental and social impact assessment in economic development.

APT 3413 Horticultural Crops 42 Hours

Role and importance of horticulture in the Kenya economy. Influence of genetic and environmental factors on the choice and production of various horticultural crops. General principles of crop husbandry of horticultural crops including, choice of growth media, plant propagation by seed and vegetative structures, multiple cropping in horticulture, site selection, planting, fertilizer application, weeding, irrigation, pruning and training, harvesting, and post harvest handling

PAC 3412 Educational planning 42 Hours

Introduction : definition , nature and scope of educational planning. Rationale of educational planning. Characteristics and dimensions of educational planning. Models of educational planning. Historical development of educational planning. Organization of educational planning. Methodologies of educational planning. Measuring internal efficiency in an education system. Stages in the process of educational planning. Population and educational planning. Planning for changes in an educational system. Issues and challenges in educational planning in developing countries.

Educational planning; History and rationale of Educational planning; Social and psychological factors in educational planning; General problems in educational planning in and outside Kenya; Methodologies of Educational planning; Planning for changes in educational system;

Administrative factors and educational planning; Economics of education; Leading economic issues of basic concern and their relevance to Kenya; Principles of economics of education and planning; Microeconomics of education; Macroeconomics of education and socio-economic development

AHT 3414 Field crops 42Hours

Growth and development of cereals, legumes and oil crops. Production of cereal crops (maize, wheat, barley, oats, rice, sorghum, pearl millet, finger millet), legumes (field beans, field peas, pigeon peas, groundnuts, soybeans, cowpea, lab Niger, grams), root and tuber crops (cassava, sweet potatoes, Irish potatoes, yams, arrowroots) and oil crops (sunflower, sesame, linseed, rapeseed).

AAS 3416: Animal Breeding 42 hours

Continuous variation, Resemblance between relatives; Genetic parameters: repeatability, heritability and correlation. Prediction of breeding values. Selection: Response to selection, estimation of genetic change, multiple trait selection including correlated response, marker assisted selection. History and development of animal breeding; Special issues in animal breed, including genotype x environment interaction and correlation. Mating systems: inbreeding and crossbreeding. Heterosis, hybrid vigour; Breeding strategies in different livestock species for various traits; National and International breeding programmes. Breeding goals and their flexibility. Advances and application of biotechnology in the genetic improvement of livestock species: AI, embryo manipulations, production and use of clones. Policy, legal and institutional framework in animal breeding practice

AEE 424: Project I **42 Hours**

Introduction to Project work; Project proposal; Problem identification; Literature review; Formulation of hypothesis; Research design; Data collection and analysis; Report writing.

Year 4 Semester 2

AAB 3421 GMOs, Biosafety & Bioethics **42 Hours**

Definition, Biosafety concerns. Biosafety regulations in various countries, International agreements related to Biosafety; Convention on Biological Diversity (CBD) and Cartagena protocol on Biosafety; International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA); Conservation strategies for seed gene bank; Climate change and conservation of plant genetic resources; Global efforts for management of crop genetic resources; Ethical issues in biotechnology. Regulatory framework of Biosafety in Kenya; Role of KEPHIS and NBA. Guidelines for recombinant DNA technology; Status, prospectus and concerns of GM crops, Biosafety of environment and human health; Guidelines for research in transgenic plants and drugs. Social and ethical issues; Biosafety issues related to genetically modified organisms (GMOs); Gene contamination;BiosafetyandRiskassessmentofGMOs;Publicperception.Important genes of agronomicinterest;Currenttrendsinfindingusefulgenes; Traceability, Legislative aspects; Biotechnological products in Kenya; Quality parameters and quarantine procedures of export.

AAE 3421 Extension Education Evaluation **42 Hours**

Reviewing purposes and Legal Basis of programs- vocational agriculture, Agricultural education and Extension education; Major program Components in vocational agriculture and Extension service systems; A working philosophy in vocational and agricultural education and Extension service; programming (programmer, learner, process); Developing and/ or Evaluating program standards in vocational agriculture, Extension systems, policies and policy making; Local Resources (why involve people, identifying, evaluating, Recruiting, Rewarding, using multicultural resources); Advisory Groups (purpose, levels, functions, organizing, using and maintaining committees); issues programming (defining issues programs, identifying issues, retranslating issues to programs); program planning process (determining needs, establishing priorities, writing goals and objectives, designing programs, implementing plans, evaluating

plans/ programs Revisiting plans); communicating program value (functions of communicating, methods of reporting); Organization and Administration of Extension Systems (Agricultural and Natural resources, youth programs, community resources development, Home Economics); Elements of program planning process (logical framework); Perspectives in program planning process.

EDU 3421 Philosophy of Learning and Teaching 42 Hours

Origins and development of teaching as a profession. Nature, meaning and role of philosophy of teaching. Concepts of teacher and teaching. Teaching and education. Teaching and cultivation of knowledge, skills, values and dispositions. Pedagogical issues in education: the learning environment, instructional strategies and procedures, learning resources and evaluation. Modern trends in teacher education: traditional teacher methodologies, teacher and electronic (e) learning, e-teacher and e-learner, teaching in a blended environment, teaching and course management systems. Comparative and contemporary issues in agricultural education. The role of adult and continuing education in agriculture.

PAC 3411 Education Administration and Management 42 Hours

Introduction to education management; Definition of administration, management, educational application of administration and management; Theories of administration; Legal basis of education in Kenya; Acts and subsequent legal notices; School organizations: Registration categorization, management, roles of boards and committees; Instructional management; Coordination of curricular activities; Selection and acquisition of instructional materials and equipments; Mentainance of school financial management; Sources of school funds; School audits, Teachers Association

AAE 425: Environmental and Natural Resources Economics 42 Hours

Economics of the environment: Environmental quality as an economic good; Environmental pollution: global problems, air borne residuals, water borne residuals, solid waste residuals; Market system and pollution: Market failures, property rights, tragedy of the commons; Economics of pollution control: Optimum level of pollution control, remedies for externalities, the bargaining solution, emissions fees, emissions standards and enforcement, transferable emissions permits; Examples of market efficiency; Allocation of specific types of resources: Replenishable but depletable resources, renewable common property resources, storable renewable resources; Economic rationale of the public sector in environmental management; Need and functions of the public sector; Conflicts and limitation in correcting market failure**.**

AAE 3427 Farm management 42 Hours

Management functions; Farm accounting; Labour management; Work study; Investment and financing; partial investment calculations; modules of simultaneous investment calculations; farming under risk and uncertainty; modules to incorporate risk and uncertainty into farm planning e.g. Linear programming. Water supply ; sources , collection and storage , pumps and pumping , conveyance , treatment. Irrigation ; methods , maintenance. Drainage; definition , importance and methods. Water pollution ; meaning , practices and methods. Water harvesting ; roof and rock catchment , weirs and dams , ponds , ditches and terraces. Micro-catchments ; types , laying out and construction methods , uses.

AEE 3422 Project II 42 Hours

Introduction to Project work; Project proposal; Problem identification; Literature review; Formulation of hypothesis; Research design; Data collection and analysis; Report writing.