LATEST EDITION

AGRICULTURAL SCIENCE

JUPEB SYLLABUS

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SYLLABUS FOR SCI - J151
AGRICULTURAL SCIENCE

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GENERAL OBJECTIVES

At the end of the series of courses, candidates should be able to:

1. enumerate the advanced principles of scientific agriculture;
2. state how agricultural knowledge can be utilized to identify and solve agricultural problems;
3. demonstrate sound and effective agricultural practices and techniques;
4. list the positive attributes required towards the conservation of natural resources and their use for sustainable development; and
5. acquire a suitable foundation for the study of agriculture or related courses at tertiary level and for professional courses which require students to have knowledge of agriculture on admission.

To achieve the aims and objectives of the curriculum, the following approaches are recommended:

1. Theory and practical must go hand in hand in the teaching and learning of the subject. Emphasis must be placed on equipping candidates with skills and concepts
2. Agriculture is a subject related to the environment of most schools, and is part of life experience of most candidates, hence the teaching and learning of the subject should take full advantage of the resources of candidates and the environment.

FIRST SEMESTER COURSES

AGR 001: AGRONOMY AND CROP PRODUCTION (3 UNITS)

AGR 002: ANIMAL SCIENCE AND PRODUCTION (3 UNITS)

SECOND SEMESTER COURSES

AGR 003: WILDLIFE, AQUACULTURE AND AGRO-FORESTRY (3 UNITS)

AGR 004: AGRICULTURAL ECONOMICS AND AGRICULTURAL EXTENSION (3 UNITS)

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COURSE DESCRIPTION

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AGR 001: Agronomy And Crop Production (3 Units)

Specific Objectives

At the end of this course, candidates should be able to:

1. define soil and explain weathering processes;
2. discuss the significance of soil texture, structure and soil pH;
3. explain the source of negative charges on clay, humus and colloids;
4. emphasize the significance of Cation Exchange Capacity (CEC) and Anion Exchange Capacity (AEC);
5. describe the structural exchanges that occur after fertilization leading to the development of seed and fruit;
6. discuss factors that affect water and nutrient uptake and explain the mechanism of water uptake(osmosis) and nutrient uptake (active transport);
7. explain the factors affecting photosynthesis, including carbon (IV) oxide compensation point (C3 and C4 systems);
8. identify and classify common farm weeds and use of farm equipment;
9. discuss the importance of horticulture in Nigeria;
10. define and classify seeds;
11. discuss the uses and maintenance of seeds; and
12. manage seedling nurseries in relation to thinning, hardening, root pruning, pests and disease control.

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Course Content

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TOPIC S	SUB-TOPICS	DETAILS
1. Agronomy and Crop Production	Soil Physical Properties	Soil formation, composition and soil physical properties e.g. soil texture, soil structure, soil capillarity, etc.
	Soil Chemical Properties	Soil acidity and alkalinity; causes and effects on crops. Correcting soil acidity.
	Soil Fertility	Soil macro elements (N, P, K, etc.) and micro nutrients (Mo, B, Zn, etc.). Nitrogen Cycle. Organic matter composition and importance to agriculture. Soil improvement through the application of Organic fertilizers.
	Soil and Water Conservation	Definition, methods and importance of soil conservation. Methods of controlling soil erosion (biological, mechanical and cultural). Methods of water conservation (dams, harvesting from roofs, water weirs, mulching).
	Irrigation	Types of irrigation systems (surface, overhead and underground systems). Importance of irrigation to agricultural production in Nigeria.

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Plant Growth and Development	Study of the cell and its contents. Cell division and enlargements leading to growth (mitosis). Meiosis, pollen structure, pollen formation and ovule development. Seed dormancy, pre-germination treatment, viability test, control and seed germination experiments.
Water and Nutrient Uptake	Mechanism of water uptake (Osmosis/Diffusion) and nutrient uptake, (Active transport system).
Photosynthesis and Respiration	Meaning and importance of photosynthesis, factors affecting photosynthesis e.g. carbon (IV) oxide, compensation point. Relationship between respiration and photosynthesis. Structure and synthesis of ATP and role of ATP as the energy currency in all living organisms.
Principles of Crop Protection	Identification and classification of common weeds, methods of weed control. Identification and classification of common pests and diseases. Control methods of pests and diseases.
Principles of Horticultural and Ornamental Crop Production	Definition of horticulture. Importance of horticulture and ornamental crop production in Nigeria. Classification of Horticultural plant including the study of one ornamental plant (rose or hibiscus) under the following headings: Origin, Methods of

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		Cultivation, Land Preparation, Management Practices, Pests and Diseases, Factors Affecting Shelf Life, Post-Harvest Handling and Marketing.
	Principles of Crop Production	Growth and study of horticultural crops (mango or orange, *Amaranthus* sp.), cereal crops (maize, rice), legumes (cowpea, soybean), under the following headings: Origin, Adaptation, Planting, Management, Pests and Diseases, Post-Harvest Handling and Marketing. Vegetative propagation methods (budding, grafting, layering, marcotting, & cutting).
	Farm Mechanization and Engineering	Definition of Farm Mechanization, Advantages and Disadvantages of Farm Mechanization, Operational Principles of the two and four Stroke Cycle Engines, Properties and Use of Fuel and Lubricants, Transmission Systems, Electrical Systems of Petrol and Diesel Engines, Tillage Implements (ploughs, ridgers, harrows).
	Animal Power and Animal Drawn Implement	Types of draught animals (Bull, donkey, horse). Animal drawn implements (Mouldboard plough, harrow, & planter).

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AGR 002: Animal Science And Production

(3 Units)

Specific Objectives

At the end of this course, candidates should be able to:

1. classify livestock feed in terms of energy, fats and protein they give;
2. describe the structure of carbohydrates, protein, lipids, nucleic acids and include functions of vitamins and minerals;
3. calculate conception, calving, farrowing, kidding and mortality rates;
4. explain the following terms as used in animal breeding and genetics (gene, locus, chromosome, genotype, phenotype, dominance, recessive, epistasis, heterozygous, homozygous, variation and heritability);
5. carry out a survey on locally available breeds of livestock to ascertain adaptability to diseases and parasites;
6. identify and classify important parasites and diseases of farm animals; and
7. identify appropriate methods of processing, storing and marketing animal products.

2. Animal Science and Production	Animal Nutrition	Classes of livestock feed (roughages, succulents, concentrates). Calculation of feed digestibility. Ration formulation.
	Reproductive Systems of Farm Animals	Urinogenital systems of farm animals. Infertility in Farm Animals (male and female). Site of fertilization in female farm animals.

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	Animal Breeding	Mendelian Laws of Heredity. Inbreeding and Crossbreeding: Advantages and Disadvantages.
	Animal Health	Identification and Classification of Important Parasites and Diseases of Farm Animals. Economic Importance of Diseases and Parasites of Farm Animals. Pests and Disease Transmission and Control.
	Animal Products	Processing, Storage and Marketing of fish, meat, egg, milk, etc.

AGR 003: Wildlife, Aquaculture And Agro-forestry (3 Units)

Specific Objectives

At the end of this course, candidates should be able to:

1. define forestry, agro forestry and wildlife;
2. explain the economic, social and ecological importance of wildlife, aquaculture and forests;
3. demonstrate timber harvesting and preservation techniques;
4. explain the principles of agro forestry, identify and enumerate types of timber tree species in Nigerian forests;
5. discuss fishery growth, environment and economy; and
6. describe methods of harvesting wildlife e.g. trapping, shooting, and netting.

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3. Wildlife, Aquaculture and Agro-Forestry	Importance of Forestry and Wildlife to the Nigerian Economy.	Economic, social and ecological importance of wildlife and forests.
	Principles of Agro-Forestry	Definition, principles and types of agroforestry. Concept of forest, forestry and silviculture. Definition and practice of agroforestry. Systems of agroforestry (e.g. Agrosilvipastoralism, Agrosilviaquaculture, Agrosilviapiculture, Agrosilvimycology, Agrosilviheliculture, etc.,). The need for conserving our forests (sources of useful medicinal herbs, dyes, fibres, game animals which energize our rural economy).
	Forestry and Climate Change	Definition of climate change. Causes, Mitigation and Adaptation to Climate Change. Effects of Climate Change on Agriculture.
	Wildlife and Forest Conservation	Meaning of Wildlife. Wildlife Conservation

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		Methods. Ecotourism potentials of Forest and Wildlife in Nigeria. Selective exploitation, Forest regulation, Afforestation, Regeneration, Taungya system, Enrichment planting, etc.
	Deforestation and Desertification	Meaning of Deforestation and Desertification. Causes of Deforestation and Desertification. Effects of Deforestation and Desertification.
	Utilization of Forest Resources	Shelter for wildlife, sources of cooking fuel, raw materials for industries e.g plywood.
	Marketing of Forest Products	Types of Forest Products and examples. Processing, marketing and exportation of the forest products.
	Aquaculture, Environment and Economy	Types of fish ponds and methods of fish pond construction. Importance of fish production to Nigerian economy. Fish culture, fish processing, fish preservation, toxicology, availability of markets. Laws and regulations on fishing.

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AGR 004: Agricultural Economics/Extension (3 units)

Specific Objectives

At the end of this course, candidates should be able to:

1. define Agricultural Economics and explain the principles of supply and demand of agricultural products;
2. define farm management;
3. identify and discuss land tenure systems and their implications on Agriculture in Nigeria;
4. identify and discuss risks and uncertainties in Agriculture;
5. calculate and illustrate price break- even point and discuss decision making processes to determine profitability and sustainability of a crop/animal enterprise;
6. define marketing and explain perfect and imperfect competition in marketing;
7. identify and explain problems of marketing agricultural products and government intervention;
8. discuss the principles of extension, role of extension agents, methods of dissemination of improved technology;
9. discuss the advantages and disadvantages of agricultural mechanization;
10. select draught animals and calculate the draught force requirement of mouldboard ploughs, calculate angles of attack of mouldboard plough and the angle of inclination;
11. describe methods of water conservation e.g. dams, harvesting water from roofs, water weirs and conservation tillage practices;
12. identify farm equipment, functionality and maintenance (tractor, harrow, plough, ridger, sprayer, etc.); and
13. discuss functional requirements of farm structures, animal housing structures and crop storage structures.

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4. Agricultural Economics and Extension	Principles of Agricultural Economics	Definition of Agricultural Economics, Principles of demand and supply of agricultural products, simple demand and supply curves, illustration with diagrams, the elasticity of demand and supply. Law of diminishing returns, principles of economies of scale in agriculture and opportunity costs.
	Principles of Agricultural Extension	Definition of Agricultural Extension. Functions and principles of Agricultural Extension. Agricultural Extension methods. Problems of effective extension programmes in Nigeria.
	Farm Management.	Land tenure systems in Nigeria and their implications to agriculture. Business objectives in farming, risks and uncertainties in agriculture, budgeting in farming business.
	Marketing of Agricultural Produce	Definition of agricultural marketing, characteristics of perfect and imperfect competition. International trade agreements and their impact on marketing. Problems of marketing agricultural produce. Government intervention progammes in agriculture (support prices and subsidies).

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RECOMMENDED TEXTS

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1. Anthony Youdeowei, F.O. C Ezeinna; *"Introduction to Tropical Agriculture"* Longman Publishers.
2. Jean Pagot; *"Animal Production in the Tropics"*. Macmillan Publishing Company.
3. R.P. Rice *et al*. *"Fruit and Vegetable production in Warm Climates"*. Macmillan Publishing Company.
4. N.C. Brady; *"The Nature and Properties of Soils"*. Macmillan Publishing Company.
5. R.G.S Bidwell; *"Plant Physiology"*. Macmillan Publishing Company.
6. David Coleman and Trevor Young. *"Principles of Agricultural Economics"*
7. David T. Johnson; *"Business of Farming"*. ELBS/Macmillan.

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