

## SCHOOL OF AGRICULTURE AND NATURAL RESOURCES

### COURSE DESCRIPTION

#### **1. *Mathematics and Computational Sciences Core***

These include Mathematics and Data analysis and Presentation (introduction to IT and computational statistics).

#### **MAT 101: Mathematics for Agriculture**

**Number of credits: 6**

**Initial competence:** basics of mathematics (basic algebra and calculus)

**Description:** Mathematics for Agriculture introduces fundamental mathematical concepts such as algebra, statistics, measurements and units, combinations and permutations probability and linear equations. It provides a foundation for other courses in applied science and agricultural science programs. This course is designed to show how mathematical equations such as algebraic equations, ratios, formulas, measurement, and analysis of data can be important in solving agricultural problems. This course will enrich the students' enthusiasm for mathematics based on their agricultural interests.

#### **ICT 402: Data Analysis and Presentation (computational statistics)**

**Number of credits: 6**

**Initial competence:** MAT 101 -A basic knowledge of calculus and probability theory (random variables, probability and distributions) and AGR 301 (Methodology of Scientific Research) are required.

**Description:** This course reviews and expands upon core topics in probability and statistics through the study and practice of data analysis. Topics include numerical and graphical summaries of data using excel spread sheet, data management, hypothesis testing, confidence intervals, counts and tables, analysis of variance, regression and principal components analysis. Data management and presentation using Microsoft soft-wares including Word, Excel, Power point shall be reviewed. Upon completion of this course, students should be able to think critically about data and apply standard statistical inference procedures to draw concise conclusions from such analyses. This course will be computationally, not mathematically, intensive and will use the R language and environment for statistical computing and graphics.

#### **2. *Natural Sciences Courses Core***

These include Biology, Chemistry and Physics.

#### **AGR 101: Chemistry for Agriculture**

**Number of credits: 6**

**Initial competence:** basic mathematics (basic calculus and algebra)

**Description:** This course is an introduction to the fundamental concepts of general and organic chemistry including atomic structure, nuclear chemistry, bonding, solutions, acids and bases, organic nomenclature, hydrocarbons and alcohols.

**AGR 102: Physics for Agriculture**

**Number of credits: 6**

**Initial competence:** Math 101.

**Description:** A course that introduces the concepts and applications of physics and their role in our daily life. Lead students to develop an integrated understanding of the theory and applications of measuring (or unit) systems, scalars, vectors, force, work, rates, energy, power, simple machines, vibrations and waves.

**AGR 105: Agricultural Biology**

**Number of credits: 6**

**Initial competence:** none

**Description:** this course covers cell and microbiology with applications in agriculture and food science. Firstly, it presents an overview of the comparative structure, function and multiplication of animal and plant cells, somatic and germ cell formation and proliferation through mitosis and meiosis as well as cell and life cycles of plants. Secondly, the classification and fundamental structures, the growth and metabolism of microorganisms, their interaction with other living things, the importance of microorganism in agronomy, horticulture, animal science and food industry are to be discussed.

**AGR 108: Introduction to Ecology and Natural resource management**

**Number of credits: 6**

**Initial competence:** None

**Description:** This course examines the complex interrelationships between organisms and the natural world. community and ecosystem ecology are emphasized as they relate to evolution and biodiversity, resource acquisition and resource utilization within an ecosystem. The principles of the sustainable management of environmental resources. The importance of the environment into agricultural systems, problems associated with the use/misuse of our natural resources and current management practices associated with their conservation as well as the impact of agricultural activity on the environment and vis-versa shall be discussed. Delivery methods include lectures (30 hours), Laboratory and practical courses including workshops, films and field trip (30 hours).

**AGR 114 Principles of Genetics and molecular biology**

**Number of credits: 6**

**Initial competence:** AGR 105 Agricultural Biology

**Description:** This course is organized in two sections:

**Section one:** It is an overview of genetics including the chromosome and DNA as the material of heredity, principles of Mendelian genetics (Uniformity, independent assortment, gametes formation and crossing over) and non-Mendelian genetics as well as their implications in population genetics.

**Section two:** This involves principles of molecular biology including the structure, function and duplication of the DNA molecule, as well as its transcription into RNA and from RNA to Protein via translation. Physical and chemical properties of nucleic acids as well as their role in cellular metabolism and applications in DNA biotechnology shall be exposed.

### ***3. Foundation Core of Agriculture***

#### **AGR 103: General Agriculture and farm practice**

**Number of credits: 6**

**Initial competence:** None

**Description:** This course includes general knowledge in Agriculture. The General knowledge is centered on Current issues and trends in Agriculture with focus on Cameroon within Africa and the World. Agriculture and Development, Gender issues, subsistence agriculture, commercial and modern agriculture, environmental factors affecting agriculture, agricultural policies, and integrated approach to agriculture, farm tools and implements. The practical aspect of this course is based on land preparation both manual and mechanic and nursery production.

#### **AGR 106: Plant propagation Methods and Farm practice**

**Number of credits: 6**

**Initial competence:** None

**Description:** This course is made up of theoretical sessions and farm practice. The Theory is centered on plant anatomy and principles of plant multiplication (grafting, cuttings, layering...). The practical methods focus on vegetative plant propagation of various plants including plantain, yam, pineapple, macabo, cassava, onion... Teaching tools will include workshops, documentaries, publications and field trips.

#### **AGR 112: Sustainable Agriculture**

**Number of credits: 4**

**Initial competence:** None

**Description:** In this course, Principles of sustainable agriculture are discussed. The student learns how to carry out sustainable agricultural practices for production while maintaining the balance

between profit making, environmental welfare and social equity with respect of policies and regulatory framework. The role of selected bio-convertors either animals, crops or microorganisms to optimize waste conversion into soil nutrient and fertility restoration will be exposed and discussed. This transition seeks to maintain the standards of quality and levels of production in selected crop and animal varieties. This course will be covered through lectures, field practical demonstrations and visits as opportunities arise.

### **AGR 206: Organic Agriculture and Farm practice**

**Number of credits:** 6

**Initial competence:** AGR 105 Agricultural biology

**Description:** This course includes theory and farm practice. Students will be exposed to the scale of the organic industry today, including the factors driving interest in organics for both producers and consumers. The foundational principles underlying contemporary organic agriculture will be presented and first-hand experience of current organic practices will be provided. In addition, this course will rely on small group mentoring to stimulate independent, learner-centered analysis of selected topics in organic agriculture. The knowledge on the production of natural fertilizer and microorganisms to improve crop production as well as biological substances to control plant diseases will also be addressed. Students gain practical experience as they process animal and plant waste to grow crops or employ natural methods to control pests and diseases.

### ***AGR 303: Introduction to Irrigation, Drainage and farm practice***

***Number of credits:*** 6

***Initial competence:*** Math 101

**Description:** Principles of hydraulics, drainage and irrigation systems, irrigation fixtures and apparatus. Irrigation and drainage systems design including pump sizing and specification, water distribution systems, plant water requirement, drainage systems and flood control. The student should understand the hydrologic cycle, principles and processes necessary to effectively manage water resources through well designed drainage and irrigation systems. At the end of the course, the student shall be able to advice on the appropriate techniques of both irrigation and drainage systems; enhance communication skills, and impart a sense of professional, ethical and societal responsibility gained through knowledge and discussion of contemporary issues. Methods of delivery include lectures, video and base group presentations as well as on farm activities and field trips as the opportunity arises,

## ***4. General Core courses***

### **AEC 201: Introduction to Farm and Agribusiness management**

**Number of credits:** 6

**Initial competence:** Mathematics for Agriculture (MAT 101)

**Description:** This course is paramount for future agriculture business leaders. It introduces basic financial management skills like how to create and follow a business plan, feasibility study, productivity and profitability, Goal-setting and fulfilment, Record-keeping, making decisions in an agricultural business by reviewing and integrating selected economic, financial, and managerial concepts. Other area covered are agriculture and selected agricultural concepts, trends in agriculture, demand and supply, characteristics of competition, financial goals and decision making, financial goals and financial statement, accounting profit, depreciation, financial analysis and opportunity cost, production theory and diminishing marginal profit, enterprise analysis, partial budget analysis, cash flow and risk, management skills and strategic planning.

### **FBT 201: Nutritional Biochemistry and Metabolism**

**Number of credits:** 6

**Initial competence:** AGR 101 Chemistry for Agriculture

**Course Description:** Topics will include the energetics of metabolism; the structure and metabolism of proteins, carbohydrates, and lipids; and the integration of metabolic systems. Students will learn the molecular structure and biochemical mechanisms of nutrition and metabolism.

### **AGR 301: Research Methodology**

**Number of credits:** 6

**Initial competence:** MAT 101

**Description:** This course is the Foundation in the philosophy of research and critical thinking in quantitative and qualitative research, experimental design applicable to independent research projects, formulation of research topics and questions, development of testable hypotheses, ethical issues in agricultural research (research integrity, animal welfare, privacy and human rights). The student shall be empowered in designing experiments, carrying out effective surveys, estimating the statistical parameters of a sample or population and performing variance and covariance analysis, interpreting and discussing results, scientific writing.

### **AEC 402: Agricultural Extension and Rural Development**

**Number of credits:** 6

**Initial competence:** None

**Description:** This course aims at enabling students to understand the different Agricultural Extension Concepts, philosophy, scope and responsibilities, approaches and methods; Research-

extension linkage; the concept theory and principles of rural development and the roles played by change agents, NGOs, community development institutions and organizations in the process. Participatory approaches development, transfer of technology, nature and constraints of rural theories, process and strategies for agricultural and rural development in developing countries will be discussed. The course requires assessment techniques; diffusion, communication theories, process and strategies for agricultural and rural development programs; importance, selection, preparation and production techniques of agricultural communication tools in extension; development and selection of ICT-based agricultural communication tools, ICTs for extension management-management of extension resources, programs and monitoring extension impacts in development. Upon completion of this course, students will possess the following skills;

- Knowledge to develop effective rural communication tools to overcome communication barriers,
- Ability to carry out complete production organization (PA or PO) diagnosis,
- Knowledge to develop effective participatory development model for sustainable rural livelihood.

### **FBT 411: Human Nutrition**

**Number of Credits:** 6

**Initial competence:** Nutritional biochemistry and metabolism

**Description:** This course exposes the anatomy of the human digestive system and principles of nutrition with application to the physiologic needs of individuals; food sources and selection of an adequate diet; formulation of recommended dietary allowances; nutritional surveillance. It also elaborates on analysis of nutrition with emphasis on human biological needs through stages of the life cycle, the physiology and the health status. It provides support for planning nutritional care including diet modifications and nutrition support; nutrition counseling and documentation on nutritional care.

## ***5. Common specialized Core courses***

### ***5.1. Animal Science***

#### **ANS 205: Anatomy and Physiology of farm animals and fish**

**Number of credits:** 6

**Initial competence required:** AGR 105 Agricultural biology

**Description:** The course covers the principles of organ and tissue structure, operation, function, regulation, and integration of domestic farm animals. Examines mechanisms and processes of

growth and development, reproduction, lactation, oviposition and effects of environmental conditions. It is an introduction to the carcass structure of cattle, pigs, sheep and poultry. Animal growth and development are considered in relation to meat production. Homeostatic control of the major body systems including nervous, cardiovascular, respiratory, urinary, immune, endocrine and reproductive systems. The method of delivery includes lectures, videos, dissections and tutorials.

### **ANS 207: Ruminant Animal Production**

**Number of credits: 6**

**Initial competence required:** AGR 105 and ANS 205

**Description:** Exposes cattle, Sheep and Goat Production and Management Application of principles of nutrition, breeding, physiology, health, facilities, marketing, and product development, to ruminant animal production. This course will enable the students to understand potentials and limitations of ruminant production to the economy of Cameroon. Also carry out efficient management practices in ruminant production for optimum production, profit, sustainability and food security.

### **ANS 202: Non-ruminant animal production**

**Number of credits: 6**

**Initial competence required:** AGR 105 and ANS 205

**Description:** This course comprises two sections. The first section is about the principles, skills, and practices of handling swine and managing commercial swine production. Aspects discussed include housing and pigsty management, reproduction, feeding and health of swine. It provides concepts of animal and animal-human interactions and animal behavior and practices to ensure animal and human well-being. Part two is about the principles of poultry production and management. Topics include anatomy and physiology, reproduction, incubation, embryonic development, breeding, nutrition and feeding, disease control, animal welfare, housing and environmental control, flock management, poultry and egg products and the structure of the poultry industry. Delivery methods include but not limited to class room lectures, field visits, farm practice, group work and presentation.

### **ANS 206: Principle of Animal Nutrition**

**Number of credits: 4**

**Initial competence required:** AGR 105

**Description:** This course establishes the foundation for understanding animal nutrition. It covers the science of nutrition, characteristics of feedstuffs, as well as their utilization and digestion in the animal body. It will also expose students to nutrients and their interrelationships; feed

evaluation including chemical analysis and feeding trials, the determination of digestibility and nutrient balance trials, feeding standards, dietary allowances and ration formulation for the various livestock species. Grazing practices as well as the management of grazing lands and forage conservation methods will be covered. The course is aimed at teaching students the general principles of animal nutrition exposing them to terminologies important in the area of animal nutrition and feeding. It will;

- Enable the students to describe the relationship between diet consumed by animals and the digestive processes throughout the gastrointestinal tract of monogastrics, ruminants, and hindgut fermenters.
- Acquaint students with feed stuffs, their availability, classification, formulation, processing and utilization.

## **5.2. Agronomy and Crop**

### **CSS 201: Soil Science and Fertility**

**Number of credits: 6**

**Initial competence requirement: none**

**Description:** This course introduces the student to the study, management, and conservation of soils as natural bodies, as media for plant growth, and as components of the larger ecosystem. It presents basic concepts of all aspects of soil science including; composition and genesis; physical, chemical, and biological properties; soil water; classification and mapping; soil conservation; management practices; and soil fertility and productivity (soil testing, use of fertilizers and manures, and liming). It introduces the relationships of soil to current concerns such as environmental quality and non-agricultural land use. This course should instill awareness of soil as a basic natural resource, the use or abuse of which has a considerable influence on human society and life in general. These will be achieved through lectures and hands-on activities in the lab and field.

### **CSS 305: Plant Pathology and Protection**

**Number of credits: 6**

**Initial competence required: None**

**Description:** The Course involves identification and classification of major field pests and diseases, Survey of plant pests and diseases, symptoms, and the different techniques commonly used in plant pest and disease diagnosis, methods of pest and disease control and economic importance of crop pest and diseases. Practical experience for students will focus on identification of pests and diseases and symptoms on students' plots and farmers' fields in the community, utilization of natural methods in controlling the identified pests and diseases.

At the end of this course, students are expected to able to:

- Identify different pests and diseases of some major crops in the field based on their symptoms.
- Identify the different cultural and preventive methods in controlling the different pests and diseases observed in the field.

### **CSS 301: Plant Breeding and Genetics**

**Number of credits: 6**

**Initial competence required:** principles of genetics and molecular biology (AGR 114)

**Description: Description:** The core concept of this course will be on methods and techniques of plant breeding and improvement on the bases of genetic principles of breeding, germ plasm, reproductive systems in plants and their role in breeding. The development, maintenance, and multiplication of plant breeding stock. Students will have practical sessions on methods of cross breeding involved in plants. The student understands and applies the principles of improving plants genetics. He/she learns the role of molecular biology in agriculture and develops skills for the selection of plants. Students should at the end of this course be able to understanding genetics at both the population and molecular levels, relate to plant breeding with plant population, gain practical experience in analyzing data from genetic experiments and estimating genetic parameters and heritability for breeding purpose and differentiate the different breeding technic used in conventional and molecular breeding.

## **6. Electives Courses**

### **6.1. Animal Science Electives**

#### **ANS 303: Non-conventionnel Animal Production**

**Number of credits: 6**

**Initial competence required:** none

**Description:** Importance of nonconventional animal production. Types and breeds used in alternative livestock production including snails, earthworms, maggots, bees, quail, rabbit, laboratory animals and grass cutters. Their biological characteristics, their ecology, ethology and the possibility of well planned production (housing, feeding, caring and reproduction of small and useful animals for market needs. Practical classes shall include workshops of small production units of snails, rabbits, maggots and earthworms/fish bait.

#### **ANS 309: Arthropods and Ectoparasites of Veterinary Importance**

**Number of credits: 6**

**Initial competence required:** none

**Description:** An introduction to the roles of insects and other arthropods in the direct causation of disease in humans and animals, and as vectors in the transmission of disease organisms. The epidemiology and replication cycles of vector-borne pathogens with major medical and veterinary importance will be examined. Information will be provided on the biology and behavior of disease vectors and external parasites, and on the annoying and venomous pests of humans and animals. Mechanisms of control will be discussed. Laboratory classes will include Taxonomy and anatomy of insects and arthropods of medical and veterinary importance. Emphasis on the mechanism of injury or pathogen transmission by each group will be closely examined.

### **ANS 411: Animal Health and Disease Control**

**Number of credits: 6**

**Initial competence required:** none

**Description:** This course presents the principles of zoohygiene - a science concerned with the effect of the maintenance condition on the health and productivity of animals- as well as the description and control methods of livestock disease of veterinary, public health and economic importance. The aetiology, epidemiology, diagnosis, prevention and control methods of important livestock diseases shall be discussed. By the end of the course, the students should understand and implement the principles of zoohygiene, master and interpret visual and behavioral signs of some diseases affecting livestock as well as the clinical and postmortem principles of diagnosis of livestock diseases. They should understand the principles of prevention and treatment/control methods of livestock diseases. This course is a fundamental core for all students projecting any graduate or future career in the field of veterinary medicine, animal health or animal science or wildlife studies.

### **ANS 405: Animal Breeding and Genetics**

**Number of credits: 6**

**Initial competence required:** Introduction to genetics and molecular biology (AGR 114)

**Description:** This course presents and describe the principles and applications of quantitative and population genetics to the conservation, preservation, selection and mating systems or improvement of animal genetic resources with a particular interest on livestock animals. The topics discussed are selection or breeding for high productivity, Disease resistance, environmental fitness and breed creation. The applications of biotechnology and related ethical issues will also be discussed.

### **ANS 412: Principles of Aquaculture and Fisheries**

**Number of credits: 6**

**Initial competence required:** Introduction to ecology and natural resource management (AGR 108)

**Description:** This course will acquaint students with the theory and practice of aquaculture. The course is designed to provide a general understanding of aquaculture and more specifically to explain the unique aspects associated with raising animals in an aquatic environment, to present an overview of important water quality variables and the factors which affect them, to present ways of increasing production levels in aquatic systems including different forms of fertilization and prepared feeds, to give an overview of the general concepts involved in transporting aquatic organisms and finally to present an overview of the reproduction, grow-out, harvest, and processing of a number of important aquaculture species.

### **ANS 410: Pasture production and forage utilization**

**Initial competence required:**

**Number of credits: 6**

**Description:** This course introduces students pursuing a degree in Bachelor of Science in Agriculture to the general principles of pasture production and management, and forage utilization by livestock. The major themes of this course are (i) the performance of natural pastures and steps that can be taken to improve and sustain their productivity in terms of forage yield and quality (ii) the agronomic principles of establishing and managing sown (ley) pastures and fodder crops (iii) the methods of efficient utilization of forage and strategies for ensuring regular forage supply all-the year round. The objective is to increase the students' awareness of the importance of pastures to humanity and the nation at large and to equip students with knowledge and skill necessary for increased production and management of pastures and efficient utilization of forage.

### **6.2. Crop science electives**

#### **CSS 303: Weeds Science and plant systematic**

**Number of credits: 6**

**Initial competence required:** None

**Description:** The objective of this course is to provide students with an appreciation and better understanding of Weed Science and plant classification and their relevance in agriculture. Lecture topics will include: weed biology -classification, weed seed biology, vegetative reproduction, weed crop competition/interference, mechanisms and factors affecting it, allelopathy, parasitism-. an introduction to weed management techniques and methodologies, factors affecting weed control, and environmental issues (emphasis on chemical weed control) associated with weed management. Topics covered in the laboratory: weed identification, crop/weed competition, application techniques including effective herbicide use and current weed control practices.

## **IPM 401: Integrated Pest Management**

**Number of credits: 6**

**Initial competence required: None**

**Description:** The deals with the identification and control of weeds, insects, and diseases as well as the integration of available control methods including prevention, biological control, resistant varieties, and pesticides. Pesticide terminology, formulations, calibration, environmental concerns, safe handling, and laws and regulations concerning pesticides to be discussed. Delivery methods include lectures, analysis of articles on current issues related to use/misuse and their impact on the environment and base group presentations.

## **CSS 401: Food and Cash crop production**

**Number of credits: 6**

**Initial competence required: None**

**Description:** Management strategies and world production of the major tropical grains, protein and oilseed crops as well as cash crops (cotton, cocoa, coffee, palm oil, and timber) are studied relative to their botanical and physiological characteristics and to available environmental resources. The utilization of the above mentioned food and cash crop for human food, livestock feed and various industrial products are examined. Delivery methods include lectures, analysis of articles on current issues and base group presentations.

## **CSS 408: Plant Physiology**

**Number of credits: 6**

**Initial competence required: AGR 105 Agricultural Biology**

**Description:** The principal aim of this course is to introduce the students to classical and modern concepts in green plants. The course will emphasize the importance of photosynthesis, gas exchange, water, and environment responses. Understanding of plant cells structure and function. Upon completion of this course, students will be able to demonstrate good mastery of the following: Plant structure, major plant tissue systems, chloroplasts, chromoplasts, plasmodesmata, and signaling control, water transport and transpiration, mineral nutrition, photosynthesis and its mechanism, C4 versus C2 plants, plant hormones. Main topics covered: Plant cell structure and function including leaf, stem, root, molecular structure and function of mitochondria and chloroplast, plasmodesmata and transport, xylem and phloem function, stomata control of transpiration, mineral nutrition, macro and micro nutrients function, deficiency, and symptoms; photosynthesis, formation and maturation of fruits.

## **CSS 414: Seed Science and Technology**

**Number of credits: 6**

**Initial competence required:** AGR 105 Agricultural Biology

**Description:** Seed science and technology will cover all aspects of seed biology, production, and commercialization. Corn and soybeans will be used as model plants because they represent the two classes of seeds, monocotyledonous or monocots, and dicotyledonous or dicots. This classification refers to the number of cotyledons in the mature seed. These two crops also represent the two major seed production systems, hybrid seed and varieties. The lectures cover all aspects of seed science and technology from the formation of a seed, its development and maturation, the dehydration process in seeds, dormancy, storage, seed germination and vigor, deterioration, seed conditioning and enhancement, seed pathology, seed production and certification. The labs are designed to complement the lectures and, in the measure that is possible, they will follow the same sequential order

### **6.3. Food Science and Biotechnology**

#### **FBT 305: Meat and Dairy Science Technology**

**Number of credits: 6**

**Initial competence required:** Nutritional biochemistry

**Description:** Basically the course will handle an introduction to the science and technology of meat, and dairy products. Students will be expected to know and understand the chemical, physical and physico-chemical properties of these foods which facilitate their usage in technology to derive secondary products. The course will expose the students to some important characteristics of meat such as: muscle contraction in live animals, postmortem changes in the muscle, meat pigments and color changes, meat handling process and grading of meat. The course will introduce some basics about poultry, fish, some meat alternatives, their nutritive values and safety.

It will also involve issues such as: types of milk and alternates, the composition of milk, sanitation and grading of milk, flavor of milk, milk processing, other milk products, whey, cooking applications, milk substitutes and imitation milk products, safety /quality of milk, nutritive value of milk and milk products, lactose intolerance and milk marketing.

#### **FBT 408: Carbohydrate, Lipid and protein science and technology**

**Number of credits: 6**

**Initial competence required:** Nutritional biochemistry

**Description:** This course will be made of three different parts. **The first part will discuss on lipid science and technologies:** chemistry and properties of lipids, lipid processing (extraction, analysis, refining, fractionation, storage, hydrogenation, inter-esterification, trans-esterification), lipid oxidation (mechanisms, consequences, prevention), and application of lipids in food industry. **The second part will discuss on carbohydrates science and technologies:** chemistry and properties of carbohydrates, carbohydrates processing (Extraction, analysis, stabilization, starch gelatinization, starch retrogradation and starch pasting), and food application of carbohydrates. **The third part will discuss on proteins science and application:** Protein structure and properties, protein processing (method of protein extraction and separation, proteins characterization procedure and protein analysis), and food application of proteins.

### **FBT 406: Alcoholic and Non-Alcoholic Beverages**

**Number of credits:** 6

**Initial competence required: Nutritional biochemistry**

**Description:** This course covers alcoholic beverages and non-alcoholic beverages. Part one introduces alcoholic beverages including wines processing, beer processing, spirit processing and the beneficial and deleterious effects of alcohol on health. The differences between alcoholic and non-alcoholic beverages, the classification of alcoholic beverages, the principle of vinification, the wine making processes, wine bottling, closure and storage, beer production process, storage and stabilization, the different types of spirits, their processing method and storage, the impacts of alcohol on health (beneficial and deleterious effects) are discussed. Part two discuss on non-alcoholic beverages. General introduction on non-alcoholic beverages, fruits juices processing, soft drinks processing, tea and coffee drinks, water and low alcohol level beers processing are discussed.

### **FBT 405: Food safety and Quality control/Assurance**

**Number of credits:** 6

**Initial competence required:** none

**Description:** The followings shall be discussed: food quality assurance and food safety, quality programs and quality systems for food industry, good manufacturing processes and HACCP prerequisite programs, as well as the HACCP system for food safety. The student should learn the vocabulary of food quality assurance, understand the concept of food safety and food quality, the quality components, types of hazards in foods, the quality system for the food industry, the GMPs and HACCP prerequisite programs, the importance of HACCP system on food safety. The student should also be able to do a critical analysis of any industrial or local production system. At the end of this course, students should have good knowledge on the basic principles of Food safety and

Quality control. They should be able to determine critical control points in the manufacturing process of any food and indicate how the danger can be eliminated.

### **FBT 409: Post Harvest technologies and management**

**Number of credits:** 6

**Initial competence required: Nutritional biochemistry**

**Description:** The core concept of this course will be focused on the general post-harvest consideration and handling, packaging of post harvested products, handling operation of the harvested products, storage, transportation, harvest and post-harvest handling of fruits, vegetables and root crops. The objective is to understand the different post-harvest processes involved in the handling of foods, in order to prolong its shelf-life, by conserving it under recommended conditions, to reduce post-harvest losses, and to be able to know the adequate technologies to be used for handling food materials. At the end of this course, students will be expected to understand the different post-harvest processes/techniques that are involved in the handling of food products. The students are also expected to be able to either advise a farmer on the best and possible techniques to use in the handling of food materials. They are expected to be able to use and apply the knowledge learnt from this course.

#### *6.4. Agribusiness and Extension*

### **AEC 303: Basic Marketing in Agriculture and the Food Industries**

**Number of credits:**

**Initial competence required:** MAT 101

**Description:** Basic concepts and principles of Agricultural Marketing and its role in agricultural development; marketing infrastructure, approaches and problems; Marketing functions; legislation and management. Marketing margins and profitability; market functionaries, marketing channels, price variation and stabilization; Review of agricultural marketing systems

### **AEC402: Project Leadership and Communications**

**Number of credits:** 6

**Initial competence required:** none

**Description:** To succeed in project management, you must be a strong leader and an effective communicator. This course examines the current philosophies of leadership as applied to project management and identifies various styles of communication and conflict resolution. Through case studies and various exercises, the student will develop enhanced leadership, communication, conflict management, and negotiation skills; as well as learn how to use collaborative processes

and facilitation techniques designed to bring community and natural resource decision makers together for focused problem solving to achieve win-win solutions

### **AEC 408: Agricultural Development and Planning**

**Number of credits: 6**

**Initial competence required:** none

**Description:** The concepts of economic development and Economic growth; characteristics of developing economies; importance and challenges of the development process. Theories of economic growth and development. Education, technological change and Economic development; Growth, Poverty and Income distribution. Theories of trade and development. Globalization and its implications for development, Debt burden of developing countries. Fundamental issues and development experiences in Cameroon; NGOs and Development organizations.

### **AEC405: Food and Agricultural Policy**

**Number of credits: 6**

**Initial competence required:** none

**Description:** This course offers a multi-disciplinary approach to understanding agricultural and food policy in developing countries with a focus on Cameroon. It draws on the theories and insights of economics, sociology, political science, and history to examine the agricultural policy process and its outcomes. Hence helping students develop a better understanding the global policy-making entities at various levels of government. It also provides a broad understanding of how policy actions in agriculture impact not only farmers' incomes, but also the well-being of consumers, the economic viability of rural communities, and the quality of a nation's environmental resources.

### **AEC407: Agricultural Project Analysis and Evaluation**

**Number of credits: 6**

**Initial competence required:** MAT 104

**Description:** This course walks students through the various stages of the project life cycle and introduces them to the basic techniques available to assess the feasibility of projects from economic, financial, social, environmental, technical and institutional perspectives. It also introduces students to various techniques in project planning, project implementation, monitoring and evaluation, and project management. It relates theory to application of these techniques and combines relevant development concepts with a clear understanding of what can be done in practice.

## **7. Professional Training In Agriculture**

### **7.1. Internships**

Internships make up part of the professional training where students interact with and learn on a day-to-day basis from local farmers, researchers, technicians, experts in various domains of agriculture and natural resources. The essence of the internships is to enable students witness and put into practice/ experience the practical reality of what they have been taught. It gives them a practical appraisal of the course programs. The internship helps the students get a professional experience in the domain of specialization. Internships are carried out at the end of each academic year, after the 2<sup>nd</sup> semester examinations, and run as follows:

#### **AGR 104: Initiation internship**

**Number of credits:** 4

**Initial competence required:** none

**Description:** The objective is to familiarize interns with the daily activities of a farmer, get exposed to various types of agricultural career opportunities in the locality. At the end of the first year, the freshmen undergo an initiation. During this period the students are attached to local farmers over a period of 30 working days (one month). They are also required to meet professionals from various agricultural related services that impact on the lives of the farmers e.g. extension services, veterinary officers, food technology industries, NGOs etc. At the end of the internship, the student submits a comprehensive report that is being evaluated by the internship coordinator and sanctioned by a score over 100.

#### **AGR 202: Pre-professional Internship**

**Number of credits:** 8

**Initial competence required:** none

**Description:** Sophomores undergo a pre-professional internship for 45 working days (one and a half months) during the long vacation. Students are encouraged to seek placement in an agricultural related company – research centers and broad-based agro-industry. The objective is to expose students to various types of agricultural activities or research being carried out in the research stations or any recognized farmer organization, give students a feel of agricultural careers and operation procedures and documentation.

## **AGR 302: Professional Internship**

**Number of credits:** 30

**Initial competence required:** AGR 202

**Description:** Juniors undergo a professional internship for 80-90 working days pertaining to their field of specialization. The school defines the type of organization where the student is placed. The objective is to gain skills, knowledge and experience in their area of interest. The students are trained to identify problems, critically analyze and propose solutions. Placements for internships are done by the school. However, suggestions are welcome from the students. Students must submit a report at the end of each level of internship to the school and to the institution where internship was undertaken. The professional internship in the junior year are officially supervised by an academic supervisor from the school and a field supervisor from the enterprise or organization. At the end of which students present the report to a panel for grading. The final score comprises the score/50 by the field supervisor and the report + defense/50.

### **7.2. Farm practice (A total of 24 credits)**

Farm practice is combined to some core Agriculture courses including General agriculture (AGR 103), Plant propagation (AGR 106), Ruminant Animal Production (ANS 207), Organic Agriculture (AGR 206), Irrigation and drainage (AGR 303) and Integrated livestock production systems (ANS 409). The practical part of the course account for 70% mean while the written test account for 30%. The subjects cover the identification of farm implements and their uses for land preparation, planting, fertilizer application, pest control, harvesting, processing and Storage; Identification of soil types and their characteristics, fertilizer types, farm survey equipment and their uses; Introductory principles of laying out field plots or laying out a farm. Crop production layout, nursery production, organic and mineral soil fertilization, on field identification of pest and diseases, sustainable agricultural practices, irrigation and drainage, record-keeping in a farmstead, routine practices in animal husbandry, acquaintance with animal breeding, field implements, field trips to fishery installations, wildlife sites and intensive crops and livestock farms within South West Region.

## **8. Initiation to Research**

### **SRP 498: Senior Year Research project**

**Number of credits:** 18

**Initial competence required:** AGR 301 and ICT 402

Description: the senior year research project is compulsory for all the students of the fourth year of the School of Agriculture and Natural Resources. Each student will conduct a supervised

research project on a topic in any of the areas of specialization in Animal and Fish Science, Food science, Agronomy or Agribusiness and extension.

### **9. Entrepreneurial Project**

To give students additional preparation in becoming self-reliant/employed upon graduation, students are required to undertake and be involved in entrepreneurial projects. During their freshman year, the students receive lectures on how to identify a project develop proposals, and draw business plans that will attract funding. They work in groups (base groups) to initiate and develop a business plan by brainstorming on business opportunities. Students are encouraged to select projects related to any of the major subject matter. Before the end of the academic year, students must present their business plans before a jury who decide if the business is worth financing.

Upon approval, the students then set up the business and may choose to continue to the junior year based on the maturation cycle of the project opted for. If these are relatively short cycle products, students may be encouraged to undertake another project. The student plan it time to run the business. Students must present reports on how their business is running at the end of each month and a comprehensive report before the end of each semester. This is to enable students have a hands-on approach towards their studies, being able to conceive, operate and management and access project. Thus upon graduation they should be able to run one and not necessary depend on working for somebody or an institution. This is to impact on students the ability to do independent work with the guidance of a faculty

### **10. Volunteerism**

All students undertake this compulsory activity that requires a total of 100 volunteer hours before graduation. This is to build a sense of social responsibility and citizenship in the students. Volunteerism is to show how the students can build their communities and country as well as build networks, developing their curriculum vitae and learning cultures or extending learning beyond the classroom. It builds in the students' a sense of stewardship.