POSTGRADUATE PROGRAM IN ANIMAL SCIENCE
(ACADEMIC MASTERS)

SUBJECT: FISH FEEDING AND NUTRITION
COURSE MENU: Digestive apparatus of teleosts. Feeding habit. Digestion and absorption of nutrients. Proteins, lipids, and carbohydrates in fish nutrition. Studies of feeding strategies, nutritional requirements, and bioenergetics. Digestibility of food. Ration calculations and processing. Nutritional deficiencies.

SUBJECT: FOOD AND FEEDING OF DOMESTIC ANIMALS
COURSE MENU: Food studies: evaluation of nutritional value, nomenclature and classification, intake, main protein and energy foods, supplementary sources of vitamins and minerals, quality standards. Additives. Mycotoxin considerations. Nutritional requirements and composition tables. Formulation and production of rations and vitamin and mineral supplements. Feeding programs.

SUBJECT: FOOD ANALYSIS
COURSE MENU: Sampling techniques. Food composition analysis and importance. Knowledge of equipment and glassware to be used. Weighing. Good laboratory sampling practices. Centesimal composition. Use. Homogenization, drying, moisture, and dry matter. Ashes and lipids. Proteins. Availability of amino acids in vitro. Protein digestibility in vitro. Crude fiber, acid detergent fiber, neutral detergent fiber, and dietary fibers. Carbohydrate determination methods. Calculation of calories and Comparison between the results obtained in the practices and the food composition table. Antinutritional factors: alpha amylase inhibitors, trypsin inhibitors, hemagglutinins. Oxalic acid, tannins, phytic acid, and glucosinolates. Minerals and vitamins. Weende x Van Soest method for determining the chemical composition of food. Analyses of organic matter, ethereal extract, crude fiber, crude protein. Determination of cellulose, NDF, ADF, lignin, calcium, and phosphorus.

SUBJECT: ADVANCED POULTRY FARMING
COURSE MENU: Socioeconomic importance and evolution of poultry farming. Major poultry breeds and lines. Anatomy and physiology of birds. Ambience. Biosafety. Production of fertile eggs for incubation. Artificial incubation. Broiler production. Commercial egg production. Notions of breeding of other birds of economic interest. Major diseases and prophylaxis. Poultry production systems. Marketing of poultry products. Research in poultry farming.

SUBJECT: BIOLOGY APPLIED TO ZOOPLANKTON PRODUCTION
COURSE MENU: Characterization, classification, and distribution of the main zooplankton groups. Zooplankton biology and ecology. Distribution patterns of zooplanktonic organisms and related factors (physical, chemical, and biological). Cultivation of cladocerans to feed fingerlings. The importance of zooplankton in aquatic environments.

SUBJECT: ANIMAL BIOCHEMISTRY
COURSE MENU: Characterization of the structure of proteins and amino acids and their biological functions. Kinetics of enzymes, cofactors, and other factors that affect enzymatic activity. Structure and biological functions of sugars and polysaccharides. Study of lipids and cell membranes. Glycolysis, Krebs cycle, and glycogen metabolism. Electron transport, oxidative phosphorylation, gluconeogenesis, and pentose cycle. Lipid metabolism, beta-oxidation, formation of ketone bodies, biosynthesis of unsaturated fatty acids. Study of protein metabolism, amino acid oxidation, urea cycle, transamination, nitrogen excretion.

SUBJECT: BEEF CATTLE PRODUCTION
COURSE MENU: Cattle breeds and production systems. Breeding of calves. Recruitment of young cattle and female puberty. Sanitary management of beef cattle. Breeding management in beef cattle. Fattening and confinement. Relevance of traceability in meat agribusiness. Management aspects that interfere with meat quality. Growth promoters.

SUBJECT: MARINE AND INLAND SHRIMP FARMING
COURSE MENU: Economic Aspects of Shrimp Farming. Main cultivated species. Larviculture. Management of Breeders. Nursery I. Nursery II. Final growth. Processing and Marketing. Main Diseases.

SUBJECT: BEHAVIOR OF BREEDING ANIMALS
COURSE MENU: Study and Application of Animal Behavior; Genetics and Behavioral Evolution; Domestication; Behavioral Physiology; Motivation and Organization of Behavior; Types of Behaviors.

SUBJECT: DEVELOPMENT IN ANIMAL RESEARCH I (COMPULSORY ACTIVITY)
COURSE MENU: Execution of the Curricular Units proposed in the Student's Academic Planning developed in agreement with the Supervisor; completion of Activities proposed by the Supervisor; participation in Projects linked to the Research Group / Research Line; among other activities, during the FIRST semester of the Master's Course in Animal Science.

SUBJJECT: DEVELOPMENT IN ANIMAL RESEARCH II (COMPULSORY ACTIVITY)
COURSE MENU: Execution of the Curricular Units proposed in the Student's Academic Planning developed in agreement with the Supervisor; completion of Activities proposed by the Supervisor; participation in Projects linked to the Research Group / Research Line; among other activities, during the SECOND semester of the Master's Course in Animal Science

SUBJECT: TEACHING INTERNSHIP (COMPULSORY ACTIVITY)
COURSE MENU: Teaching practice in undergraduate course under the guidance and supervision of a teacher of the permanent staff responsible for the subject.

SUBJECT: STATISTICS APPLIED TO ANIMAL EXPERIMENTATION
COURSE MENU: Organization and analysis of quantitative data: creation and maintenance of data files on computers. Descriptive statistics, probability elements, statistical inference, and statistical tests (chi-square, t-test, simple linear regression, correlation, analysis of variance, and logistic regression). Basic principles of zootechnical experimentation. Significance tests and analysis of variance. Experimental designs. Testing of experimental groups and analysis of covariance.

SUBJECT: PASTURE FORMATION AND MANAGEMENT IN THE CAATINGA
COURSE MENU: Ecosystem and ecology of Caatinga pastures. Vegetation inventory and forage availability. Pasture formation in the semiarid. Recovery and renewal of degraded pastures. Rational use of pasture. Grazing systems.

SUBJECT: FOUNDATIONS IN AQUACULTURE OF CONTINENTAL AND MARINE AQUATIC ENVIRONMENTS
COURSE MENU: History of aquaculture in Brazil and in the world; Legal aspects in aquaculture and its importance for sustainable development of the activity; Development of aquaculture projects; Water quality; Cultivation of Molluscs, Crustaceans, and Fish; Live food production; Production of oyster larvae and seeds; Production of larvae and post-larvae of crustaceans and fish juveniles; Aquaculture sanitation; Fish processing and marketing;

Environmental Impacts and support capacity in aquaculture; Environmental Management in Aquaculture.

SUBJECT: POLLINATOR MANAGEMENT AND CONSERVATION
COURSE MENU: History of the pollination service and the decline of pollinators in agricultural areas; floral biology with emphasis on pollination; pollination syndromes; floral visitors and effective pollinators; taxonomic identification of the main groups of pollinators with emphasis on bees (Apoidea); floral visitor survey techniques; techniques for determining pollinator efficiency; nesting biology with emphasis on bees; trophic niche; pollinator-friendly practices; management of colonies of social bees for pollination; management of artificial nests of solitary bees for pollination.

SUBJECT: METHODS FOR CONTROLLING CROP PESTS
COURSE MENU: Characteristics and classification of insects of agronomic interest. Major pests of forage plants. Taxonomy. Ecology. Behavior of forage pests. Damage and control of crop insect pests: grass-cutting ants, grasshoppers, termites, leafhoppers, cochineals, bedbugs, and caterpillars. Methods for controlling crop pests.

SUBJECT: MODERN TECHNOLOGIES FOR BEEF CATTLE PRODUCTION
COURSE MENU: Agribusiness and meat production systems. Meat production and the environment. Completion in pasture and confinement. Management aspects that interfere with meat quality. Growth promoters.

SUBJECT: NUTRITION OF MONOGASTRIC ANIMALS
COURSE MENU: Particularities in the metabolism of the various nutritional factors for poultry and swine. Nutritional requirements. Study of balanced rations and formulation of mineral and vitamin supplements for poultry and swine. Particularities in the feeding and nutrition of sows in gestation and lactation, and piglets. Particularity in the feeding and nutrition of commercial laying hens, broilers, heavy fowl, turkeys, quails, emus, and ostriches. Special topics in nutrition and feeding of poultry and pigs. Evolution of the science of monogastric nutrition. Digestion and absorption of major nutritional fractions of food. Metabolism of carbohydrates, lipids, proteins, vitamins, and minerals. Additives. Nutrition of poultry, swine, fish, and horses.

SUBJECT: RUMINANT NUTRITION
COURSE MENU: History, importance, and trends of ruminant nutrition. Ruminal fermentation and intestinal digestion of the main nutritional fractions of food: absorption of nutrients. Metabolism of carbohydrates, lipids, and nitrogen compounds. Vitamins in the metabolism of other compounds. The influence of additives on digestion, absorption, and metabolism in ruminants. Nutritional dysfunctions: consequences.

SUBJECT: ORIENTED RESEARCH (COMPULSORY ACTIVITY)
COURSE MENU: Execution of the research work approved in the Dissertation Project activity.

SUBJECT: MARINE AND INLAND FISH FARMING
COURSE MENU: National and international panorama of marine and inland fish farming - history and economic importance. Fundamentals of fish biology. Main native and exotic cultivated species and their producing countries. Production systems (continental and marine) - cultivation stages and techniques. Cultivation Structures. Fundamentals of hydrobiology and water quality for marine and inland fish farming. Breeding management and fish larviculture. Use of live food and rations in fish farming. Fundamentals of sanitary management in marine and inland fish farming. Perspectives on the development of foodfish and ornamental fish farming and their sustainability.

SUBJECT: TOXIC PLANTS FOR ANIMALS OF LIVESTOCK INTEREST
COURSE MENU: Study of the main plants that affect the functioning of the cardiac system, digestive system, liver, renal system, nervous system, respiratory system, muscle system, reproductive system, integumentary system; plants of radiomimetic action; plants that cause systemic mineralization (calcinosis); plants that cause hemolytic anemia; cyanogenic plants; plants that cause mechanical/traumatic injury.

SUBJECT: SHEEP AND GOAT PRODUCTION
COURSE MENU: Sheep: Origin and History; Sheep in the world and in Brazil; Economic importance of sheep; Essential care for sheep; Evolution of sheep, wool, meat, and milk; Sheep management; Sheep castration; Sheep worming; Orientation for production and breed choice; Sheep rearing systems; Selection and breeding of sheep; Facilities and equipment. Location, orientation, design, and management of facilities. Program of cleaning and disinfection of facilities; Goats: Origin and History; Goats in the world and in Brazil; Evolution of goats, milk, meat, and skin; Rearing systems; Containment modes and fences for goats; Orientation for production and breed choice; Reproduction, artificial insemination, and gestation. Breastfeeding, Weaning, Castration, Fattening; Hygiene of goats; Major diseases that attack goatlings; Preventive sanitation.

SUBJECT: SILAGE PRODUCTION AND FORAGE CONSERVATION
COURSE MENU: Basic and applied concepts related to growth processes and the subsequent alterations in parameters of the anatomohistological composition of forage plants. Aspects related to forage production, conservation, and use. Use of lignocellulosic fibrous residues in ruminant feed. Approaching topics from the field of food production and conservation for production, identification of problems, and appropriate technical solutions.

SUBJECT: PRODUCTION AND CULTIVATION OF BIVALVE MOLLUSCS
COURSE MENU: Characterization, origin, and evolution of groups of molluscan species of economic interest. Evolutionary morphological aspects, external and internal morphology. Anatomy and physiology of species, characterization and importance of captive breeding. Forms of breeding. Importance of the group in the context of national and international aquaculture, ways of use for human consumption, Importance of the activity for sustainable development of coastal communities, cultivation methodology, production processes, farming system; Sanitary aspects and commercialization.

SUBJECT: ENGLISH LANGUAGE PROFICIENCY (COMPULSORY ACTIVITY)
COURSE MENU: Assessment of basic knowledge of foreign language (English), carried out through a subjective test elaborated by the professor responsible for the activity.

SUBJECT: DISSERTATION PROJECT (COMPULSORY ACTIVITY)
COURSE MENU: Written presentation of the Dissertation project, under the guidance of the supervisor.

SUBJECT: MICROBIOLOGICAL AND PHYSICOCHEMICAL QUALITY OF ANIMAL PRODUCTS
COURSE MENU: Milk: chemical composition, macrocomponents, and its relation to the processing of derivatives. Quality control in the dairy industry. Cheese maturation: chemical, microbiological, and physicochemical transformations. Principles and methods of preserving red meat and poultry meat. Conservation by cold, heat, drying, and dehydration. Conservative substances and additives used. Eggs: Physicochemical deterioration. Microbiological deterioration. Methods of preserving eggs *in natura*; refrigeration, glazing, oiling, pasteurization. Egg processing: drying, cooling, and freezing of whole eggs, egg whites, and

egg yolks. Elaboration of some meat products. Fish: Fish processing: refrigeration and smoking. Agribusiness for minimally processed fish.

SUBJECT: SEMINARS IN ANIMAL SCIENCE I (COMPULSORY SUBJECT)
COURSE MENU: Elaboration and oral presentation of a literature review of the subject selected by the student under the guidance of his/her supervisor.

SUBJECT: SEMINARS IN ANIMAL SCIENCE II (COMPULSORY SUBJECT)
COURSE MENU: Oral presentation of the research project related to the Dissertation work under the guidance of the supervisor.

SUBJECT: ADVANCED TOPICS IN ANIMAL REPRODUCTION
COURSE MENU: Approaching current aspects related to physiology and the different reproduction biotechniques in domestic animals, focused on animal production.

SUBJECT: ADVANCED TOPICS IN FISH TECHNOLOGY
COURSE MENU: Fish as food. Fish muscle structure. Fish chemical composition. Changes in postmortem fish. Fish processing by the action of cold (cooling and freezing). Fish industrialization: salt processing and drying; canning processing; smoking, pasta, and canned products; anchovy-type products. Use of by-products of the fishing industry: fish flour and oil. Evaluation and quality control of fish. Risk assessment and HACCP system in the fishing industry. Health and sanitation systems in the fishing industry.

SUBJECT: SPECIAL TOPICS IN AQUACULTURE
COURSE MENU: Theoretical-practical course, with an essential up-to-date character, presenting and discussing the latest topics, theories, and methods of analysis in the field of aquaculture. The course can be offered by any qualified professor, both in the PPGCA framework and outside it.

SUBJECT: SPECIAL TOPICS IN RUMINANT PRODUCTION
COURSE MENU: Theoretical-practical course, with an essential up-to-date character, presenting and discussing the latest topics, theories, and methods of analysis in the field of Ruminant Production. The course can be offered by any professor qualified in this area of knowledge, both in the PPGCA framework and outside it.