POSTGRADUATE PROGRAM IN SOILS AND QUALITY OF ECOSYSTEMS (MASTER'S DEGREE)

SUBJECT: AGROECOLOGY
COURSE MENU: Concepts of natural ecosystems and agroecosystems. Functioning of agroecosystems. Biotic and abiotic factors in agroecosystems. Inter- and intraspecific ecological interactions. Genetic resources in agroecosystems. Diversity and stability of the agroecosystem. Principles of Plant Demography and Population Ecology. Ecological Niches. Diversity and sustainability of agroecological systems. Development of productive chains in agroforestry systems.

SUBJECT: SOIL BIOLOGY
COURSE MENU: Soil organisms. Soil ecology; Metabolism and microbial processes, Soil organic matter; Biochemical transformations and cycles of the elements; rhizosphere; biological nitrogen fixation; mycorrhizal associations; environmental impact of the use of phytosanitary products in the soil on the microbial population; Xenobiotics and soil bioremediation.

SUBJECT: RESEARCH DEVELOPMENT
COURSE MENU: Development of research training in specific topics in the fields of Soil Science and ecosystem quality.

SUBJECT: ECOSYSTEMS OF BAHIA STATE
COURSE MENU: Properties, origin, and use of the main ecosystems of Bahia State; morphological, physical, chemical, biological, and management characteristics in these ecosystems, linking to the physiographic regions of Bahia State. Current and potential uses, natural and anthropogenic risks of degradation, and agricultural practices best suited to correct the main limitations and aiming at the sustainability of agrosystems.

SUBJECT: SOIL FERTILITY
COURSE MENU: Laws of soil fertility; nutrient-soil interaction and nutrient availability for plants; soil reaction; liming; plastering; soil organic matter; availability of soil macro- and micronutrients; soil sampling and chemical soil analysis for the purpose of recommending correctives and fertilizers; main correctives and fertilizers.

SUBJECT: SOIL PHYSICS
COURSE MENU: Study of the relationships between soil physical characteristics and properties (texture, structure, densities, porosity, compactness, water, air, and temperature) and plant development; Interrelation between soil physical properties and water management, erosion, soil moisture, and thermal regime. Soil air and aeration, knowledge of methods and equipment used in research on soil physics.

SUBJECT: PHYSIOLOGY AND BIOCHEMISTRY OF PLANTS UNDER STRESS
COURSE MENU: Study of physiological and biochemical changes occurring in higher plants submitted to the effects of abiotic and biotic stresses of interest in Biochemistry, Physiology, and their applications in the agronomic and biological sciences.

SUBJECT: ENVIRONMENTAL GEOCHEMISTRY
COURSE MENU: The atomic nucleus and the origin of the elements. Geochemical abundance of elements. Principles of thermodynamics applied to natural systems. Lithogeochemistry. Surface geochemistry. Chemical equilibria and interaction of the major heavy metals in the

soil. Major global biogeochemical cycles. Eutrophication and contamination of water resources and soils. Heavy metals as pollutants and as nutrients.

SUBJECT: INSTRUMENTATION FOR CHEMICAL ANALYSIS OF SOIL-PLANT AND WATER
COURSE MENU: Analytical sequence, instrumental methods of analysis, analysis of chemical species of agricultural interest, introduction to automatic methods of chemical analysis. Concepts involved in the sampling process, sample treatment, achievement of results, and data treatment.

SUBJECT: MANAGEMENT AND CONSERVATION OF TROPICAL SOILS
COURSE MENU: Soil management and conservation in Brazil. Basic principles for the management and conservation of soil and water and environmental preservation. Hydrology concepts applied to the conservation of soils and the environment. Concepts and fundamentals for the characterization and management of natural resources in watersheds. Soil erosion. Degradation and recovery of soil productivity. Use and management systems for tropical soils. Methods of diagnosis and management for sustainable use of tropical soils. Research methods for soil and water management and conservation.

SUBJECT: SOIL ORGANIC MATTER
COURSE MENU: Global cycle of carbon and nitrogen. Origin of soil organic matter. Constituents of soil organic matter. Dynamics and function of organic matter. Compartments of organic matter and their functions in soil. Processes of organic matter decomposition, mineralization, and humification. Physical, chemical, and biological factors that control the transformation of soil organic matter. Methods of characterization of soil organic matter. Direct and indirect effects of organic matter on soil fertility. Management of organic matter in different tropical ecosystems. Organic matter and soil quality in tropical agroecosystems. Greenhouse gas emissions and mitigation potential.

SUBJECT: MINERAL PLANT NUTRITION
COURSE MENU: Production in the soil-plant-environment system; elemental composition of plants; essentiality of nutrients; cellular structure; root and leaf tissue morphology, root and leaf absorption, ionic kinetics, ionic transport and redistribution; nutritional requirements; physiological functions of macro- and micronutrients; toxic and useful elements; assessment of the nutritional status and quality of agricultural products; methodologies for analyzing chemical elements in plant material; hydroponic cultivation: principles, advantages and disadvantages, solution preparation, and practical application.

SUBJECT: ENVIRONMENTAL PEDOLOGY
COURSE MENU: Weathering, Soil Formation Factors and Processes, Soil morphological characteristics, Soil diagnostic horizons, Soil chemical, physical, and mineralogical characteristics; Soil diagnostic attributes; Description and analysis of soil profiles; Soil classification; Brazilian classification of soils. Soil-landscape interrelationship.

SUBJECT: SOIL CHEMISTRY
COURSE MENU: Study of the fundamental relationships between soil chemical factors and plant growth. Chemical and structural characteristics of soil reactive components and the study of their relationships such as ion exchange, acidity, oxireduction, nutrient retention and release for plants. Sources, reactions, transport, effects, and fate of chemical species in the soil. Emphasis on the chemical behavior of elements and compounds, and phenomena affecting natural and anthropogenic materials in the soil.

SUBJECT: RECOVERY OF DEGRADED AREAS

COURSE MENU: Conceptualization and characterization of degraded area. Notions of environmental legislation; environmental impact studies (EIA), and environmental impacts reports (RIMA). Sources and effects of environment degradation. Objectives of the recovery of degraded areas (RAD). Mining activity and its environmental impacts. Pedogenesis in the context of environmental recovery. The role of tree species in RAD. Ecology principles applied to RAD processes. Key RAD strategies.

SUBJECT: SOIL-PLANT RELATIONSHIP
COURSE MENU: The soil as a source of nutrients. Mechanisms of absorption of water and nutrients by plants. Effects of roots on soil. The influence of water availability and excess salts in the soil on the physiological processes related to crop growth and development. Physical soil factors that affect plant development. Adaptation of plant species to adverse soil conditions.

SUBJECT: SEMINAR ON SOIL SCIENCE I
COURSE MENU: Techniques for the presentation of seminars and use of audiovisuals; presentation of current technical-scientific topics in the fields of Agrarian Sciences, Soils, and Ecosystems.

SUBJECT: SEMINAR ON SOIL SCIENCE II
COURSE MENU: Presentation of a seminar on the theme of the Dissertation Project.

SUBJECT: GIS APPLIED TO ECOSYSTEM PLANNING
COURSE MENU: General concepts, areas of interest, and history. Cartography and data integration. GIS components. Data structure. Data sources for GIS. Geostatistics applied to soils. Introduction to Remote Sensing.

SUBJECT: SOILS AND QUALITY OF ECOSYSTEMS
COURSE MENU: Concept of environmental quality. Brief information on physical, chemical, and biological soil factors influencing soil quality. Contamination of surface and groundwater. The role of soil in the biogeochemical cycle of the main elements that cause environmental problems. Influence of trace metals and pesticides on human and animal health and soil quality.

SUBJECT: SPECIAL TOPICS IN SOIL SCIENCE I
COURSE MENU: Defined based on the content to be studied in the subject.

SUBJECT: SPECIAL TOPICS IN SOIL SCIENCE II
COURSE MENU: Defined based on the content to be studied in the subject.