

Introduction : Master's Program, Graduate School of Agricultural Sciences Yamagata University

1. Goals

The Master's Program, Graduate School of Agricultural Sciences of Yamagata University aims to provide high-level academic knowledge from a broad perspective, based on both the general and specialist education programs offered by the faculty, and to foster research capabilities in the majoring fields as well as advanced capabilities for related professions that require high-level expertise.

2. Department, Major, Specialized Subjects, and Contents.

Department	Major	Specialized Subjects	Contents
Agricultural Sciences	Bioproduction Science	Crop Science	Practical education and research on environmentally conscious types of agricultural technology are conducted, focusing on rice and other food crops.
		Crop Breeding	Research is conducted on gene mechanisms and the diversity of important traits of crops, and the development of improved crops by using molecular markers.
		Vegetable Science	Research is conducted on the stress physiology of fruit vegetables, sugar metabolism, physiological disorders in fruits, etc.
		Pomology	Includes advanced education and research on basic theory for high-quality and high-yield crops, as well as cultivation management technology, targeted at fruit trees including Yamagata Prefecture's specialties such as cherries, pears, apples, and persimmons.
		Ornamental Horticulture	Principally, education and research are conducted on the growth and environmental factors of perennial ornamental plants, preservation and utilization of traditional flowers, and growth by tissue culture.
		Plant Pathology	Plant pathology is a science that study identification of pathogens (fungi, bacteria, viruses, etc.), diagnosis and control of diseases. This subject includes studies on plant protection, Epidemiology, Forecasting, Plant-microbe interactions, mechanisms of pathogenicity and disease resistance.
		Animal Ecology	The field of study of animal ecology includes research on the mechanisms that determine the population of each animal species, and on the biological control of harmful insects focusing on the interaction between aphids and their insect predators.
		Edaphology	Research is conducted, from the standpoint of environmental conservation, on the interaction between cultivation and soil environment, through the nitrogen cycle of crops, particularly rice, which is a Japanese staple food.
		Animal Science and Technology	Within the animal (livestock) production sector, practical education and research related to local agriculture are enhanced, centered on the preparation of feed and clarification of nutritional physiology.
		Agricultural Machinery Engineering	Research is conducted on post-harvest engineering of agricultural produce, and on labor-reducing farm technology in the production of paddy rice and open-field cultivated vegetables.
		Science of Biomass Utilization	Developmental work is conducted on new refinery technology to promote the production of useful materials and energy from unused biomass mainly composed of agricultural and food waste. Additionally, research is conducted on the utilization of analyses of the structure of microbial communities for evaluating stability in biomass conversion that uses microorganisms.

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Agricultural Sciences	Bioproduction Science	Economics of Food, Agriculture and Environment	Economic analysis is carried out in relation to problems of food, agriculture, and agricultural regions as well as those of resources and environments, and education and research are conducted on plan design methods and consensus formation methods to revitalize agriculture and agricultural regions.
		Consumer behavior	Based on the basic knowledge of the consumer decision-making process and mechanism, education and research are conducted on the current state and the direction of development about food-related consumer issues, consumer behavior, marketing activities of companies that Respond to them.
		Policy of Food, Agriculture and Environment	Based on essential knowledge relating to food and agricultural policy, education and research are conducted on the background, current situation, and developmental direction of current food and agricultural policy.
		Environmental Accounting for Food and Agriculture	Education and research on fostering the ability to analyze and study agricultural management strategies relating to a low-carbon society from the point of view of environmental accounting.
		Sociology of Food, Agriculture and Environment	With an understanding of the various social “problems” faced historically by Japanese regional societies, education and research are conducted to foster the capacity for multifaceted analysis of causal factors relating to current social problems, covering historical, economical, and sociological viewpoints.
		Geography of Food, Agriculture and Environment	Learn how people and industries in different regions of the world are connected to the natural environment, history, culture, society and economy of the region. In particular, we try to identify the key foundational elements supporting communities and industries with the viewpoint of human geographic analysis, which focuses on spatial aspects and seeks to apply knowledge across other regions.
	Bioresource Science	Applied Microbiology	Education on the physiology, ecology, and diversity of anaerobic microorganisms in various environments, isolation and morphological, physiological, biochemical and phylogenetic characterization of novel anaerobic microorganisms, and the development of environment conservation and recycling technologies based on microbial functions.
		Food Processing	Food Processing is designed to address the following theme: technology development of new foods from food materials and unutilized and underutilized resources.
		Animal Reproductive Biology	Research is conducted using mammals and poultry on 1) the influence of various environmental factors on germ cell functions, 2) the mechanisms of growth and differentiation of germ cells, 3) the development and application of reproductive technology.
		Food Microbiology	Research is conducted on the industrially useful enzymes produced from <i>Aspergillus oryzae</i> , on the characteristics, and biochemical and structural investigation. Furthermore, research on the effective use of those mentioned above is conducted.
		Bioresources Chemistry	Natural products are produced by all classes of organisms, plants, animals, and microorganisms. In this subject, students obtain modern methods of determining the structure of isolated natural products from microorganisms. And this will also focus on the medical and nutritional applications of natural products on the basis of the structure-activity relationship.
		Molecular and Cellular Biochemistry	Research is conducted on the control mechanisms operating in the maturation and germination of embryos and growth phenomenon, focusing on the features of phytohormone biosynthesis and its functional mechanisms, using mainly higher plants as materials and molecular and cellular biochemical methods.

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Agricultural Sciences	Bioresource Science	Plant Genetics and Breeding	Research is conducted on gene mechanisms and the diversity of important traits of cultivated crops, on the production of improved breeds and mother plants by utilizing the results, on utilization for breeding such as the development of molecular markers, and on the evolution of plants such as cultivated crops and related wild species.
		Plant Genetic Resources Science	With the aim of conserving native species of wildplants and crop resources in each region, on the background, characteristics, traditional agricultural methods and culture of utilization are studied through document-based research and site investigations, combined with analytical methods.
		Plant Nutrition and Soil Science	Study on mechanisms of low phosphorus tolerance of plants and utilization of mycorrhizal fungi for agriculture and forestry. Study on carbon and nitrogen dynamics in different terrestrial ecosystems with global warming.
		Biological and Applied Organic Chemistry	Research is conducted on the mechanisms and use of useful physiologically active substances in native organisms. The creation of useful compounds by utilizing microorganism functions, and the exploitation and study of the mechanisms of biological functional substances.
		Postharvest Physiology	Analysis is performed on the mechanisms of post-harvest quality changes in agricultural products from the viewpoint of physiology and metabolic science, and using the results as a basis for studies, research is conducted to establish appropriate post-harvest control techniques for a range of individual agricultural products.
		Microbial Resource Utilization	Assessment of the living environment of microorganisms by means of molecular ecological methods is conducted. Exploitation of unused microorganism resources (Bacteria, Archaea) latent in various environments and analysis of the metabolic functions of microorganisms is conducted. The development of utilization technology for unused microorganism resources is studied.
	Bioenvironmental Science	Watershed Conservation	Heavy snow is one of the main characteristics of the University forest research center. It offers an excellent opportunity to conduct ecological studies in different forest ecosystems, mainly forest water balances carbon and nitrogen cycles. Additionally, the instructor's involvement in projects on climate change in Russia and Mongolia provide students with a global view of recent global climate change.
		Institutional Analysis of Forest	Research is conducted to elucidate a better governance of the forest from the standpoint of the new institutional social science. One of our purpose is to rebuild the study on the governance form of the forest on the basis of recent remarkable development of the social science including economics and the sociology.
		Forest Wildlife Management	Forests provide a core of habitats for diverse wildlife species. This subject aims to generate sustainable sciences for facilitating wildlife management by mainly focusing on ecological interactions among wildlife, forests and human activities.
		Forest Influences	Focus on studies to identify the functions of forests that public benefits, particularly relating to preventing wind and sand-blowing in coastal dune areas. Meanwhile, research is conducted on interactions between environmental conditions and vegetation dynamics to promote forest watershed environment conservation and rehabilitation.
		Forest Products	Focusing on the biological resources found in forests, particularly on the trees and microorganisms that are essential for us to lead healthy and enriched lives, education and research are conducted on culture production, structural constituent investigation, and conversion to bioactive or value-added products, through chemical and biotechnological methods.

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Agricultural Sciences	Bioenvironmental Science	Forest Design	Tohoku forests along the Sea of Japan are composed of remote beech forests in mountains and countryside forests that contain cryptomeria artificial stands and are strongly bonded to regional economic activities. In order to fulfill various functions of those forests sustainably, building new logics to promote the design, management, maintenance, or restoration of forest ecosystem is the urgent issue.
		Landscape Ecology	Understanding ecosystems from a spatial perspective.
		Water Environment Engineering	(1) Contamination of water environment and relevant physicochemical and biological processes, (2) health risk assessment due to contaminated water and foods, and (3) sustainable water use for agriculture.
		Regional Connectivity	Regional Connectivity is about the Relationship between local resource and Local Community toward revitalizing rural areas and realizing sustainable local resource management.
		Soil Physics	We carry out education and research on elucidation and control of water, supplies, and energy flow at farmlands aiming to maintain and use environmental friendly farmlands that enable sustainable food production.
		Rural Planning	This course will try to approach the topics of “creating environments for the efficient production of plants” and “creating environments for sustainable agricultural village” from the viewpoint of land sciences. Especially, the course will explain the planning associated with technologies for creating farmland consolidation work that supports agriculture to reduce the environmental stressors concerning water pollution, greenhouse gases emission and soil deterioration.
		Land Resource Science	This course will try to approach new consolidation and management methods as basis for water-material flow sciences at farmlands as the soil-plant-air system, aiming to maintain and use the farmlands with environmental conservation that enable the improvement of sustainable food production.
		Stream Environment, Environmental Hydrology	Centering on agriculture, we seek sustainable water utilization and the relationship between organisms and their habitats and aim for the realization of a better coexistence. In particular, we acquire specialized knowledge such as agricultural water utilization, river environment, hydrosphere biology, water quality hydrology, and environmental hydraulics and carry out education and research through field surveys at various fields including University experimental forests, farms, and the Shonai area.

3. Approval of Course Completion and Degree

We will approve completion of the course and grant a master's degree in Agriculture for the students who have enrolled in this department for more than 2 years, acquired 30 or more credits including required subjects, and passed the master's thesis screening and the final exam.

4. Enrollment to the United Graduate School of Agricultural Science, Iwate University (Doctoral Program)

Graduate School of Agricultural Sciences, Yamagata University, does not have own doctoral program but has joint programs with Iwate University and Hirosaki University. The joint programs of three majors (Bioproduction Science, Bioresource Science, and Regional Environment Creation), nine specialties that ordinarily three years are offered at the United Graduate School of Agricultural Science (UGAS), Iwate University. UGAS students can study at one of the three member universities where their supervisors work. Master's students at the Graduate School of Agricultural Sciences, Yamagata University, as well as graduates from the school in the last three years, do not have to pay entrance examination fee and enrollment fee for UGAS.