M.S. Degree in Plant Science

The Master of Science (M.S.) Degree in Plant Sciences program encompasses all aspects of plant life integrating concepts and information from the molecular to the ecosystem level. The principal objective of this program is to educate students in concepts and research methods in field/horticultural crops, soils and natural resources. This is achieved through course work and research that bridge a number of physical and biological sciences. This new degree program addresses the need to prepare students in basic courses such as plant molecular biology as well as applied courses such as natural resource protection. The program also addresses the need for plant scientists to have strong statistical and computational skills appropriate to the broad range of advanced plant science disciplines. The M.S. degree is designed to further the professional training of the students through formal courses while at the same time teaching students how to conduct research and present pertinent results.

A minimum of 31 semester hours, including thesis, is required to obtain this M.S. degree. The thesis is designed to familiarize students with applied research and provide them with hands-on opportunities in plant science research techniques and instrumentation. The curriculum includes core and elective courses and seminar experiences. The core courses are Advanced Plant Sciences, Biometry, Chemical and Physical Principles of Soils, Genetics and Plant Breeding, Master's Thesis and Graduate Seminar. Broad based elective courses are offered including emerging disciplines such as Food Microbiology and Microbial Biochemistry. These newly designed courses prepare students to engage in current priority areas such as human nutrition, health, obesity, food safety and bio-security. The other courses also provide opportunities for training in emerging technologies such as plant molecular biology and Geographic Information Systems (GIS).

Admission Requirements

Admission requirements for the M.S. Degree in Plant Science are similar to other Masters' programs at the University. The prospective student must present a competitive GRE score and a minimum of 20 semester hours in the sciences. The credits in the sciences may be either graduate or undergraduate courses in mathematics, general chemistry, botany, soils, microbiology, physics and related disciplines. Students who do not fulfill the science credits requirements may be admitted provisionally with the understanding that all conditions must be removed within one year of enrollment and none of the remedial science courses will count toward degree completion requirements.

Applicants will be considered once a complete application package has been submitted. Each complete package will be forwarded to the M.S. in Plant Science Committee for review and interview of qualified candidates. This committee will make recommendations to the Chairperson of the Department of Agriculture and Human Ecology. The Chairperson of the Department of Agriculture and Human Ecology will then recommend the top candidates who meet all admission requirements to the Dean of the School of Graduate Studies, Research and Outreach. The Dean of the School of Graduate Studies, Research and Outreach will notify the candidates of their admissions status.

Program Requirements

The M.S. Degree in Plant Science will be conferred to candidates upon the completion of all academic requirements in effect at the time of their first registration, provided the students are continuously enrolled and the requirements are met within the specified time frame. All work towards the degree must be completed within six (6) years of the date of initial registration in the graduate program, excluding periods of military service.

1. Credit Requirements – Candidates for the Master of Science Degree must complete a minimum of 31 semester hours, which include 25 semester hours of course work plus a thesis of six (6) semester hours.

2. Grade Requirements – Degree applicants must maintain a grade point average of 3.00 (B) in the courses taken in their approved graduate program.

3. Transfer Credits – In the 31-hour program, nine (9) semester hours earned at another accredited graduate institution may be accepted toward the Master's degree. Such transfer credits must be approved by the major advisor and must be of "B" quality or higher. Transfer of credit in the core courses is prohibited.

4. Continuous Enrollment – Students in the graduate degree program must meet the following conditions in order to maintain satisfactory progress toward the completion of the degree:

   • Achieve a satisfactory grade of "A" or "B" in all attempted coursework for graduate credit.

   • Must maintain a cumulative grade point average (GPA) of 3.0 at all time. A student who received two (2) "C" grades or one (1) "D" or "F" grade in coursework will be withdrawn from the graduate program. However, under special circumstances, students may appeal their withdrawal status by petitioning the Policy and Petitions Committee of the School of Graduate Studies, Research and Outreach.

5. Major Professor and Committee – All students entering the program shall be advised by a major professor and an advisory committee of faculty members. This group shall provide assistance with course selection, advice concerning the M.S. program and direct research focus. The Committee shall consist of a minimum of three (3) members, all of whom must be members of the VSU graduate faculty. Individuals who are not graduate faculty members, for example, from another institution or from industry, must apply to the Dean of the School of Graduate Studies, Research and Outreach for temporary membership.

Curriculum

The curriculum requires a minimum of 31 credits, distributed as follows:

Plant Science Core Courses	13 credit hours
Plant Science/Biology Electives	12 credit hours
Masters' Research and Thesis	6 credit hours

Core Course Descriptions

PLSC 510 BIOMETRY – 3 semester hours
The application of statistical techniques for biological/plant sciences. Topics would include sampling techniques, experimental designs, statistical techniques to characterize variation and management of data. This course is intended for imparting applied, hands-on training to plant scientists.
Prerequisite: MATH 121

PLSC 535 GRADUATE SEMINAR – 1 semester hour
Presentation and discussion of topics of current interest in plant science and review of literature on selected topics.
Prerequisite: Consent of advisor and instructor

PLSC 541 ADVANCED PLANT SCIENCE – 3 semester hours
Advanced course involving the physiology and determination of plant yield, advances in photosynthesis, respiration and transpiration, plant productivity under stress, biological nitrogen fixation and regulation of plant growth.
Prerequisite: SOCS 242

PLSC 544 GENETICS AND PLANT BREEDING – 3 semester hours
Theoretical and applied aspects of advanced principles and mechanisms related to heredity of quantitative and qualitative traits of plants and their movement. Methods and techniques used to breed crops.
Prerequisites: BIOL 320, PLSC 444 or PLSC 448

PLSC 545 CHEMICAL AND PHYSICAL PRINCIPLES OF SOILS – 3 semester hours
Mineralogical composition of soils, colloid and cation exchange phenomena, soil structure, plasticity and soil water. Concentration diagrams related to solubility and dissolution of minerals and fertilizers in soils.
Prerequisite: SOCS 242

PLSC 549 MASTERS' THESIS – 6 semester hours
Research conducted towards completing the thesis requirements for M.S. in Plant Sciences.

Elective Course Descriptions

PLSC 508 GEOGRAPHIC INFORMATION SYSTEMS (GIS) – 3 semester hours
An introduction to geographic data structures, computerized spatial display and analysis and applications of GIS, with emphasis on natural resources management.
Prerequisite: Consent of instructor

PLSC 514 PLANT MOLECULAR BIOLOGY – 3 semester hours
A focus on principles and techniques related to manipulations of the hereditary material in plants related to function and improvement.
Prerequisite: BIOL 320

PLSC 520 WETLAND ECOSYSTEM AND MANAGEMENT – 3 semester hours
Origin and processes in the formation of wetlands. Functions and values of wetlands, wetland delineation, wetland classification, regulations that affect wetlands. The importance of wetlands to surface and groundwater quality. Techniques to manipulate or protect wetlands to meet the needs of human, aquatic and terrestrial wildlife.
Prerequisite: SOCS 242

PLSC 526 SAS FOR PLANT SCIENTIST – 3 semester hours
Training of students in the management, analysis and interpretation of quantitative and qualitative data using SAS software.
Prerequisite: PLSC 510 Biometry

PLSC 527 CURRENT TOPICS IN PLANT SCIENCES – 3 semester hours
Independent current and advanced work on topics related to plant and soil science. Such topics include the use of plants in medicine and health, environmental issues, use of genetically modified organisms, international trade, production under adverse environments, etc.
Prerequisite: Consent of advisor and instructor

PLSC 534 PLANT PROTECTION – 3 semester hours
Diseases and insect-pest in plant production, integrated pest management (IPM), pesticide classification, toxicology, formulation, application techniques, safety, legal considerations and environmental impact. Topics on the discovery and development of new pesticides. The course will be offered by an interdisciplinary team to cover pesticides used against all pests.
Prerequisite: CHEM 305 and 307

PLSC 538 CROP SCIENCE TECHNOLOGY – 3 semester hours
Production techniques for different soils, climate, moisture and temperature requirements for successful crop production. Directions to crop management research and science; low input, sustainable agriculture.
Prerequisite: Consent of instructor

BIOL 531 FOOD MICROBIOLOGY – 4 semester hours
Role of microorganisms in food borne illness and food quality, spoilage and preservation. Control and destruction of microorganisms in foods and their production environments. Hands-on laboratory experience with microorganisms found in foods. Focus on spoilage organisms, food borne pathogens and microbial fermentation.
Prerequisite: Consent of instructor

BIOL 542 MICROBIAL BIOCHEMISTRY – 3 semester hours
The primary purpose of the course is to provide graduate and advanced students with a basic understanding of biochemistry, molecular and cellular biology. Other topics in the course include understanding the principles involved in membrane transport, permeation cell communication and signaling.
Prerequisite: Consent of instructor

Course Sequence

	Year 1	
	Fall Semester	
PLSC 510	Biometry	3
PLSC 541	Advanced Plant Science	3
PLSC	Elective	3
	Spring Semester	
PLSC 544	Genetics and Plant Breeding	3
PLSC 545	Chemical and Physical Properties of Soils	3
PLSC	Elective	3
	Year 2	
	Fall Semester	
PLSC 535	Graduate Seminar	1
PLSC	Elective	3
PLSC	Elective	3
	Spring Semester	
PLSC 549	Masters' Thesis	6
	Total	**31**