PLANT AGRICULTURE

The MSc and PhD programs in the Department of Plant Agriculture offer specialization in four broad fields of the Plant Sciences:

1. **Plant Breeding and Genetics** has long been a key focus of our faculty and students. Through breeding and biotechnology, Guelph researchers help society by developing new field-crop, fruit, ornamental and vegetable cultivars that are grown in Canada and worldwide. Also, Plant Agriculture faculty and students seek both to understand the fundamental mechanisms that enable plant improvements and to discover novel methodologies and technologies that will be the foundation for future advances.
2. **Plant Biochemistry and Physiology** is a broad discipline. Faculty and students in this area study the response of plants to environmental change and plant development at the ecosystem, whole plant, and molecular levels. Students investigate ecologically friendly management strategies, study underlying molecular and biochemical mechanisms that regulate plant development, investigate how plant performance can be optimized in the field or closed environments, and contribute to cultivar development
3. **Crop Production Systems** research seeks to develop or test agricultural management strategies for yield improvement and economically and environmentally sound production practices in field and horticultural crops such as ornamentals and turf. Students assist producers and industry in the control of weeds, insects and plant diseases, and investigate new management protocols for production of high quality crops.
4. **Bioproducts** is a multi-disciplinary field and will deal with background sciences ranging from chemical engineering to plant science. Students deal with products and materials made from cellulose, oil, protein, starch and other compounds derived from various plant parts such as seeds, stalks/stovers, hulls and cobs of crop plants. Students will develop their expertise in analytical methods, factors affecting quality of plant-derived raw materials, engineering (including bioengineering of bioproducts) biomaterials and biocomposites.

Administrative Staff

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Graduate Faculty

This list may include Regular Graduate Faculty, Associated Graduate Faculty and/or Graduate Faculty from other universities.

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Associated Graduate Faculty

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Associated Graduate Faculty

Cheryl Trueman
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Rene C. Van Acker
B.Sc., M.Sc. Guelph, PhD Reading - Professor and Dean, Ontario Agricultural College
Graduate Faculty

David J. Wolyn
BS Rutgers, MS, PhD Wisconsin - Professor
Graduate Faculty

MSc Program

Admission Requirements

Applicants should have a baccalaureate degree in an honours plant science/biology program, or the equivalent, from a recognized university or college with an average academic standing of at least 'B' during the last two years of full-time study (or equivalent). To assist in identifying a suitable thesis advisor(s), applicants should submit a short statement of research interests. Supportive letters of reference are essential and should outline the applicant's strengths and weaknesses. Students may be admitted in the Fall, Winter or Summer semesters. The University of Guelph requires that applicants from some foreign institutions have a MSc (or equivalent) degree before they are considered for admission to the University of Guelph's MSc program.

Program Requirements

MSc students conduct basic and/or applied research on topics within the four program fields.

A program of prescribed courses (at least 1.50 credits of 6000 level courses) and additional courses is established with the student's advisory committee. All MSc candidates must complete a thesis and present a seminar in conjunction with the final oral examination. Students are required to participate in PLNT*6400 Seminar and in a Departmental Colloquium course dealing with current topics. Students are expected to participate in Departmental events, with particular emphasis on seminar series.

PhD Program

The Department of Plant Agriculture offers a PhD program in four broad fields of the Plant Sciences:

1. Plant Breeding and Genetics;
2. Plant Biochemistry and Physiology;
3. Crop Production Systems; and
4. Bioproducts.

Students conduct research on topics within these fields.

Admission Requirements

The usual requirement for admission into the PhD program is a MSc degree by thesis in a field appropriate to their proposed area of specialization with a minimum 'B' average and supportive letters of reference. Direct admission to the PhD program is permitted to applicants holding an honours baccalaureate degree and demonstrating extraordinary academic and research capabilities. It is also possible for a student to transfer from the MSc without completing the requirements for that degree if the student has an excellent academic record and has strong research progress that can be expanded to the doctoral level. The request for transfer must be initiated by the student and must be done no earlier than the end of the second semester and no later than the end of the fourth semester. Applicants should submit a statement of research interests, background experiences, and career goals to assist in the identification of an appropriate faculty adviser with the resources necessary to support the thesis research. Students may be admitted in the Fall, Winter or Spring semesters. In some instances, applicants who already hold a MSc may be required to initially register in the MSc program.

Program Requirements

The major emphasis in the PhD program is on research and the preparation and defense of an acceptable thesis. All PhD candidates must complete a thesis and present a seminar in conjunction with the final oral examination. Students are required to participate in PLNT*6400 Seminar and in a Departmental Colloquium course dealing with current topics. There are no other specific course requirements. It is usual for most students, in consultation with their advisory committee, to select some appropriate courses in preparation for the qualifying examination and thesis research. The qualifying examination is in two parts (written and oral) and evaluates the student's knowledge of their field of specialization and related topics. The qualifying examination is taken no later than the fifth semester. For students who have transferred from the MSc program or have been admitted directly to the PhD program from a BSc, the qualifying examination is taken no later than the seventh semester. The advisory committee is required to submit a written evaluation of the student's performance in research and the student's potential as a researcher. Upon completion of the qualifying examination, the student becomes a candidate for the PhD degree.

All students are expected to participate in Departmental events, with particular emphasis on seminar series.

Collaborative Specializations

International Development Studies

The Department of Plant Agriculture participates in the PhD collaborative specialization in International Development Studies (IDS). Please consult the International Development Studies (calendar.uoguelph.ca/graduate-calendar/collaborative-specializations/international-development-studies/) listing for a detailed description of the PhD collaborative specialization.

Toxicology

The Department of Plant Agriculture participates in the master's/doctoral collaborative specialization in toxicology. Please consult the Toxicology (calendar.uoguelph.ca/graduate-calendar/collaborative-specializations/toxicology/) listing for a detailed description of the master's/doctoral collaborative specialization.

Courses

PLNT*6010 Physiology of Crop Yield Winter Only [0.50]
This course covers factors affecting biomass production and yield, with primary focus on phenomena measured at the whole canopy scale. Yield-limiting abiotic stresses (temperature, water deficit, nutrient deficiency) are considered in detail, as are technical aspects of instrumentation used in crop physiology research.
Offering(s): Annually
Prerequisite(s): PBIO*3110
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6040 Foundations in Plant Agriculture Fall Only [0.50]
This course presents the diversity of plant agriculture through case studies and discussion topics that familiarize students with the breadth and depth of plant agriculture. The course emphasizes skills to find resources, collaborate and communicate within plant agriculture.
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6080 Plant Disease Epidemiology and Management Fall Only [0.50]
This course focuses on the epidemiology and management of plant diseases including infection cycles, host-pathogen interactions and disease progress curves, and how the science informs disease management strategies. Students will explore the scientific literature and participate in presentations and discussions.
Offering(s): Even-numbered years
Prerequisite(s): ENVS*3210 or PBIO*4070
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6100 Advanced Plant Breeding I Winter Only [0.50]
The practical consideration of genetic theory and biological limitations to improving plant populations and developing cultivars are discussed. Current and emerging breeding methodologies and sources of variation used to achieve plant breeding goals are examined through lectures, paper discussion, site visits and invited talks.
Offering(s): Annually
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6110 Fruit and Vegetable Technology Fall Only [0.50]
The course is primarily intended to address science and technology aspects of fruits and vegetables, with specific reference to storage, packaging, quality, processing, products and ingredients, health regulatory properties and biotechnology issues. Methods of instruction include lectures and seminars. Students are evaluated during their seminar presentations, term papers and participation in discussions.
Offering(s): Even-numbered years
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6140 Biological and Cultural Control of Plant Diseases Winter Only [0.50]
This course explores current concepts and approaches to managing pathogens and diseases in detail but other methods (e.g. genetic resistance) will be presented as well. Offered in conjunction with PBIO*4070. Extra work is required of graduate students.
Offering(s): Annually
Restriction(s): Credit may be obtained for only one of PBIO*4070 or PLNT*6140
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6160 Advanced Plant Breeding II Winter Only [0.50]
Fundamentals of quantitative genetics. Topics include gene and genotype frequencies means, variances, covariances and resemblance among relatives. Lecture topics are expanded through discussion of classic and current papers.
Offering(s): Odd-numbered years
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6210 Herbicide Physiology and Biochemistry Fall Only [0.50]
This course provides a comprehensive study of the major herbicide groups. The various herbicide groups are discussed under the following topics: herbicide uptake and translocation, herbicide mode of action, herbicide selectivity, weeds controlled and crop injury.
Offering(s): Odd-numbered years
Department(s): Department of Plant Agriculture
Location(s): Guelph, Ridgetown Campus

PLNT*6230 Colloquium in Plant Physiology and Biochemistry Unspecified [0.25]
An open discussion course designed to review and critically analyze contemporary issues in plant physiology and biochemistry.
Offering(s): Annually
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6240 Colloquium in Crop Production and Management Unspecified [0.25]
An open discussion course designed to review and critically analyze contemporary issues in crop production and management.
Offering(s): Annually
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6250 Colloquium in Plant Genetics and Breeding Unspecified [0.25]
An open discussion course designed to review and critically analyse contemporary issues in plant genetics and breeding.
Offering(s): Annually
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6260 Advanced Plant Genetics I Fall Only [0.50]
A lecture and discussion course examining the underlying principles of genetics and the recent advances in plant genetics. Topics include: structure of the genome, experiments to measure and experimentally describe phenotypes, population structures, and molecular basis of inheritance of a phenotype.
Offering(s): Odd-numbered years
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6290 Physiological and Developmental Genetics in Plants Fall Only [0.50]
A lecture and discussion course examining classical and molecular genetic investigations to understand the genetic basis and regulation of physiological and developmental processes in plants.
Offering(s): Even-numbered years
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6320 Metabolic Processes in Crop Plants Fall Only [0.50]
A comprehensive examination of the metabolic mechanisms and versatility whereby autotrophic organisms sustain themselves. Emphasis is placed on our current understanding of the regulation and integration of metabolic processes in plants and their physiological and agricultural significance including available research methodologies. Students should have an undergraduate course in biochemistry prior to registering in the course.
Offering(s): Annually
Prerequisite(s): BIOC*2580
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6340 Plant Breeding Fall Only [0.50]
This course examines principles of plant breeding in self- and cross-pollinated crops. Additional topics include crop domestication, mating systems, heritability, gain from selection, disease resistance, polyploidy, marker assisted selection and government regulations. Offered in conjunction with MBG*4160. Extra work is required of graduate students.
Offering(s): Annually
Restriction(s): Credit may be obtained for only one of MBG*4160 or PLNT*6340
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6350 Remote Sensing for Plant Agriculture Fall Only [0.50]
This course presents concepts and techniques used to collect, process, analyze, and present remotely sensed data for plant agriculture applications. Students learn botanical characteristics of vegetation and their influence on remote sensing. Students gain hands-on experience for applications in field crops and specialty crops, such as yield prediction and stress detection.
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6400 Seminar Fall and Winter [0.25]
All graduate students present a departmental seminar on their research proposal in their second or third semester. Each student is expected to participate in the seminars of colleagues and faculty.
Offering(s): Annually
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6440 Solutions for Plant Agriculture Summer Only [0.50]
This course surveys the agricultural operations in Ontario and focusses on site visits to both farms and research stations. Students create and plan implementation of innovative solutions to problems facing plant agriculture using science driven solutions. The course emphasizes application of knowledge and skills learned throughout the first two semesters of the program. The course includes six hours of field trips every two weeks.
Restriction(s): Restricted to Master of Plant Agriculture students.
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6450 Plant Agriculture International Field Tour Fall Only [0.25]
A field course designed to increase student's knowledge of primary field and animal agricultural production systems, to explore the environmental and political issues related to international agriculture, and to understand the role of agri-business in the rural economy.
Offering(s): Annually
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6500 Applied Bioinformatics Fall Only [0.50]
This course covers current methods for making use of large molecular data sets to identify the genes that control traits, to characterize genes' functions, and to infer genetic relationships among individuals. It focuses on case studies and current research in agriculture, environmental biology, and medicine to introduce molecular data analysis methods, including analyzing genome sequences, constructing nucleotide alignments, constructing phylogenies, and finding motifs and genes in biological sequences. Lab sessions include an introduction to Unix and Python/R for the biologist and hands-on use of several molecular data analysis problems. Offered conjunction with BIOL*3300. Distinct work is required of graduate students.
Offering(s): Annually
Prerequisite(s): MBG*2040 and STAT*2040 or STAT*2230
Restriction(s): Credit may be obtained for only one of BIOL*3300 or PLNT*6500
Department(s): Department of Plant Agriculture
Location(s): Guelph

PLNT*6800 Special Topics in Plant Science Unspecified [0.50]
A study of selected contemporary topics in plant science. Proposed course descriptions are considered by the Department of Plant Agriculture on an ad hoc basis, and the course is offered according to demand.
Department(s): Department of Plant Agriculture
Location(s): Guelph

Other Courses

UNIV*6020 Experimental Design and Applied Data Analysis for the Agricultural Sciences