This handbook was prepared and edited by departmental graduate students and faculty of the Department of Horticulture at the University of Wisconsin.

1997
The Department of Horticulture offers a range of graduate study programs providing both basic and applied training in the science of higher plants. The department provides graduate training leading to the Master of Science in Horticulture and the Doctor of Philosophy with a major in Horticulture. The department also participates in the Plant Breeding and Plant Genetics Program, the Cell and Molecular Biology Program, and the Biometry Program which are offered on an inter-departmental basis with several allied departments. Degrees in more than one department can be earned simultaneously (joint major). Specializations are available in several aspects of crop science: biochemistry and molecular biology of horticulture plants; crop production and management; environmental regulation of growth and development; genetics, cytogenetics, and breeding; weed science and herbicide physiology; microculture and biotechnology; biostatistics; stress physiology. Students have the opportunity to develop their research problem using economic plants: fruit, trees, ornamentals, turf, vegetable or certain specialty crops, or model plants such as Arabidopsis or tobacco.

General Information

Admission
Application for admission is made on forms available from the graduate school. The information returned on the completed application form assists the Department in its evaluation of the applicant's potential for success in graduate study and in the assignment of the applicant to a program suitable to the student's interest. No one can be admitted unless an individual faculty member accepts a student and agrees to become that student's major advisor. Thus direct contact with individual professors is required.

Requirements for Admission
In addition to meeting the requirements of or the Graduate School, the applicant must also be approved for admission by the Department of Horticulture. The student's academic preparation should include fundamental courses in the plant sciences, such as botany, bacteriology, genetics, and physiology, as well as courses in general, organic, quantitative chemistry, physics, mathematics, and biochemistry. The academic average should be at least 3.0 (on a 4.0 scale) with evidence of proficiency in subjects related to agriculture and plant sciences. Other students may be accepted for graduate study with the understanding that deficiencies must be absolved. Foreign students must also complete the TOEFL exam for admission.

Financial Assistance
Students considering graduate work in horticulture are encouraged to make application for assistantships and fellowships with the department. Many graduate students receive appointments as part-time research assistants at stipends which are established by the Graduate School. Assistantships are part of specific research programs or an individual professor and therefore, the awardee has responsibilities to the program providing the stipend.
Requirements - Master of Science - Horticulture

1. General
The program of study towards an M.S. degree is developed by the student and the major professor. Considerable flexibility in selection of courses is permitted to meet the needs and interests of the candidate. Graduate students often complete requirements for a Master's degree in 1 1/2 years; 3 years is usually considered the maximum time necessary.

2. Academic requirements
The candidate must:

a. Have successfully completed 14 credits in Horticulture courses and 11 credits in Botany courses in his combined undergraduate and graduate programs. No more than 3 credits of Special Problems (699 at UW) can be counted to meet this requirement.

b. Satisfy one of the following three options:
   1) Complete 24 credits while in Graduate School and present a thesis acceptable to the final examining committee and the U.W. Library.
   2) Complete 27 credits while in Graduate School and present a comprehensive report of research acceptable to the major professor.
   3) Complete 30 credits while in Graduate School.

In each of the above options, at least 18 credits must be in graduate level courses while enrolled in UW graduate school [NOT including UW (699) or research (990)] credits. At least one credit of graduate seminar in the Horticulture Department must be included. These options will fulfill the Graduate School's requirement for residence credit.

A maximum of 3 credits of Special Problems (699 at UW) can be included toward meeting the total credit requirements of each option.

c. Satisfactorily complete a final examination on the subject matter covered during the period of study. This is normally an oral examination by a committee of 3 or more faculty members. The examination may be written if the candidate and the committee agree.

Requirements - Doctor of Philosophy

1. General
Students whose goal is a Ph.D. degree should have a broad background in biological and physical sciences. The academic grade point average in undergraduate study should be at least 3.0 (on a 4.0 point scale). A genuine interest in plant science and an aptitude for research are prime requisites for success in a Ph.D. program. The department usually recommends that graduate students obtain an M.S. degree as an intermediate stage in doctoral studies.

A Ph.D. candidate must present a minimum of 108 weeks of residence credit beyond the B.S. degree. Two weeks of residence credit are granted for each hour of graduate-level credit completed satisfactorily during a semester which may be in formal courses or in independent study approved by a major professor. One-half of the residence credit must be earned for work taken at UW-Madison. To remain in a graduate study program and to maintain eligibility for financial assistance, the student must maintain a 3.0 grade point average in all academic work exclusive of credits for independent study. If the grade point drops below 3.0 the student will have one semester in which to raise it back to 3.0 or above. Eligibility for many assistantships and scholarships require that the student be enrolled for at least nine
graduate credits during the normal academic term and for 2 credits during summer session. After satisfactorily completing the preliminary examination and meeting the residency requirement, eligibility is maintained with a minimum of 3 credits during each semester and with 2 credits during the summer session.

2. Academic Requirements
For majors in Horticulture, the academic program of each Ph.D. student is determined by the student and the student’s Certification Committee.

Specific Requirements for Ph.D.

Minor
A student must complete a minimum of 10 graduate credits in horticulture, including 2 credits of Horticulture 910.

Major
1. In addition to the Graduate School requirements for the Ph.D. degree, the following course requirements must be satisfied:
   a. Physical Sciences — one course in each of the following:
      1) Physics, including electricity, heat, and light
      2) Mathematics, through calculus
      3) Chemistry, organic lecture and organic or biochemistry laboratory
   b. Biological Sciences — one course in each of the following:
      1) Crop Production
      2) Plant Breeding
      3) Plant Structure, Plant Taxonomy, or Plant Physiology
      4) Plant Pathology or Entomology
   c. Statistics/Biometry
   d. Soil Science
   e. It is highly recommended that the following be included:
      1) A course where the student gains hands-on expertise with the use and operation of computers.
      2) A course where the student is exposed to the theory and methods of classroom instruction.

2. The requirements of one of the following three focus areas be met:
   a. General Horticulture
   b. Crop Physiology
   c. Plant Breeding

These focus areas are detailed in the pages which follow. The requirements listed are considered minimum and the full program of a Ph.D. student will be developed in consultation with the student’s Certification Committee. Other focus areas may be added as necessary.

Mention of specific courses in any of these requirements is made as a guide. Other courses of equivalent rigor and content and as approved by the Certification Committee.
can meet the requirements. Unless specifically stated, courses used to satisfy the general requirements above cannot be used to satisfy the requirements in the focus areas.

3. Examination:

There are three occasions when the program followed for an advance degree is evaluated. They are (I) Certification, when the program of courses to be taken is critically considered; (II) the Preliminary Examination for Ph.D. candidates whose course work is close to completion; (III) the Final Examination, usually focusing on the thesis research.

(I) The Certification Committee. During the first year and preferably in the first semester of study, a certification committee of at least three faculty is appointed to review the student's academic preparation and to prepare a list of requirements for his/her academic program. The committee consists of the student's major advisors and one or more additional professors. Two of the faculty must be from Horticulture.

This committee is responsible for developing a program that will guide the student to his objectives and will assure an excellent academic background in the selected major study area. Although there is no minimum credit requirement for a Ph.D. degree, this committee insures that the study requirement of the Graduate School and the major departments are met.

Copies of the certification document should be filed with the department chair, the student, and all members of the Certification Committee.

(II) The Preliminary Examination. A comprehensive preliminary examination is given when the student has satisfactorily completed most or all of the prescribed course work. This is ordinarily an oral examination but may be written if the candidate and the committee agree to this procedure. This examining committee is composed of five or more faculty members appointed by the major professor.

This examination provides an opportunity for the committee to evaluate the student’s competency in his/her field of study. Successfully passing this examination advances the student to candidacy for the Ph.D. degree. A failure to pass the preliminary examination delays the student’s progress for one semester after which he/she may retake the examination. A second failure will terminate the student's graduate study program. The preliminary examination is normally taken after three years and within four years of full-time graduate study including Master’s degree work. No minimum waiting period is required between the date in the preliminary examination and the conferring of the Ph.D. degree. Summer School is considered as one-half academic year in this requirement.

(III) The Final Examination. All candidates are required to submit a dissertation based on original research which should contribute new and meaningful information and ideas to the field of study. This dissertation shall be presented in acceptable form and shall be submitted two weeks before the candidate may take the final oral examination.

A final oral examination is mandatory. The candidate is examined on his research and dissertation by a committee of five or more members of the graduate faculty appointed by the Dean of the Graduate School with the major professor as chairman. This committee is often the same as the preliminary examination committee, but it need not be; at least one member from outside the major department must be included. A failed final examination may be retaken only once and not less than one semester after the final
examination failure. The final examination and conferring of the Ph.D. degree are normally completed within four years of continuous residency and should be completed within six years.

4. Research:

Graduate students are expected to do research during their entire training.

The thesis presented at the final examination must show substantial experimental and literary effort.

Requirements for the Plant Breeding and Plant Genetics (M.S. and Ph.D.), the Molecular Biology (Ph.D.), and the Biometry (M.S.) interdepartmental programs can be obtained by writing to the Program Director of each (c/o the Graduate School).

When a student’s interest and experience clearly overlaps two departments, a joint major for the Ph.D. can be accomplished. Horticulture can be declared as the major department with another department as the joint major department. The full requirements for a Ph.D. of each department must be satisfied with a maximum of 25% of the graduate credits common between departments.

Visit the Allen Centennial Gardens (teaching gardens) at 620 Babcock Drive, surrounding the home of former deans of the College of Agriculture and Life Sciences and listed on the National Registry of Historic Places.
Focus Area: General Horticulture

This specialization is intended for students that wish to get a broad-based training in Horticulture Science.

Requirements

1. Fruit and/or vegetable production, 3 credits (Hort 340,341,371,372,373)
2. Nursery and/or greenhouse management, 3 credits (Hort 330, 331,334, 335, 360, 361)
3. Biochemistry, 3 credits (Biochem 501,601,621)
4. A second course in statistics or experimental design, 3 credits (Agron 770, Stat 572)
5. Graduate Seminar, 3 credits two or which must be in the Horticulture (2 credits minimum beyond the M.S. degree)
6. Ten credits for 3 of the 5 areas listed below:

   Plant Structure - Botany 300 - Plant anatomy
   Botany 305 - Comparative morphology
   Botany 860 - Plant cell biology

   Plant Breeding & Genetics - Hort 561 - Introductory cytogenetics
   Hort 861 - Chromosome manipulation
   Genetics 631 - Plant genetics
   Genetics 666 - Physiological plant genetics

   Physiology - Botany 350, 500 - General plant physiology
   Botany 570 - Cellular biology
   Hort 629 - Growth regulators
   Hort 701 - Physiol. of dry matter accumulation
   Hort 720 - Physical regulation of plant growth

   Plant Nutrition & Soils - Hort 328 - Nutrition of hort crops
   Soils 326 - Soils and plant nutrition
   Soils 523 - Microbial biochem of soils
   Soils 622 - Soil physical
   Soils 621 - Soil chemistry

   Taxonomy & Ecology - Botany 400 - Classification of Cultivated and native plants
   Botany 401 - Classification of seed plants
   Botany 460 - General ecology
   Botany 402 - Dendrology
   Interdis 560 - Principles of IPM
   Botany 802 - Physiological ecology
   IES 461/462 - Systems analysis
Focus Area: Crop Physiology

This specialization gives advanced training in the physicochemical basis of crop productivity.

Requirements

1. Biochemistry, 3 credits (Biochem 501,601,602,621)
2. Plant physiology, 3 credits (Botany 350,500); can also meet general requirements
3. Plant Taxonomy, 3 credits (Botany 400,401)
4. Plant Structure, 3 credits (Botany 300,305,860)
5. Advanced plant physiology, 9 credits
   
   Botany 802 - Physiol ecology
   Botany 840 - Reg mech in plant develop
   Botany 845 - Molecular aspects of plant develop
   Botany 850 - Mineral nutrition of plants
   Hort 701 - Physiol of dry matter accum
   Hort 629 - Growth regulators
   Hort 720 - Physical regulation of plant growth
   Forestry 450 - Tree physiology
   Botany 860 - Cell biology

6. Physiological research techniques, 2 credits

   Botany 832
   Biochem 652,653,654
   Hort 375,875

7. Graduate seminar, 3 credits two of which must be in Horticulture 910.
Focus Area: Plant Breeding

The specialty gives the student background in the principles and practices of genetic manipulation of plants in horticulture.

Requirements

1. General biochemistry, 3 credits (Biochem 501,601,621)

2. A second course in statistics/experimental design, 3 credits (Agron 770, Stat 572)

3. Advanced genetics, 3 credits (Genetics 631, 666) Plant Path 517, Hort 811, 861)

4. All the following plant breeding courses or equivalent, 10 credits
   - Hort 501 - Principles of plant breeding
   - Hort 502 - Techniques of plant breeding
   - Hort 561 - Introductory cytogenetics
   - Agron 850 - Advanced plant breeding

5. Advanced Plant Breeding (2-3 credits) (Plant Path 517, Hort 811,861)

6. 8 credits from 3 of the 4 areas below

   Plant Structure
   - Botany 300 - Plant anatomy
   - Botany 305 - Comp. morphology
   - Botany 860 - Plant cell biology

   Plant Nutrition
   - Hort 328 - Plant nutrition of Hort crops
   - Botany 850 - Mineral nutrition of plants
   - Soil Sci 326 - Soil science and plant nutrition

   Plant Physiology
   - Botany 350
   - Botany 500
   - Botany 845

   Crop Production
   - Hort 330
   - Hort 334
   - Hort 340
   - Hort 341
   - Hort 360
   - Hort 371
   - Hort 372
   - Hort 373

7. Graduate seminar, 3 credits, two of which may be in Horticulture.