

# HORTICULTURAL SCIENCES

## Program Information

The Horticultural Sciences (HOS) graduate program is administered jointly by the Environmental Horticulture (HSE) and Horticultural Sciences (HS) departments and offers graduate programs leading to the Master of Science (thesis or nonthesis options) and the Doctor of Philosophy degrees. The Department offers a combination bachelor's/master's degree program. Contact the graduate coordinator for information. Members of the program's Graduate Faculty include department resident faculty and faculty at University of Florida Research and Education Centers located throughout Florida.

For admission to the HOS graduate program, apply to either the HS or HSE departments, depending on your career/research interest.

## Requirements

A strong undergraduate or graduate background in horticultural, biological, agronomic, or other disciplines in the life sciences and undergraduate coursework in chemistry, physics, and mathematics. A prospective graduate student need not have majored in horticulture as an undergraduate or master's student; however, students with curriculum deficiencies are required to take prerequisite subjects during the first year of graduate study. Undergraduate courses taken to correct curriculum deficiencies do not count for graduate program credit.

Specializations in the HS department focus on vegetable and fruit crops and include

- Plant Breeding and Genetics
- Crop Production and Nutrient Management
- Postharvest Biology
- Organic Sustainable Agriculture
- Weed Science
- Physiology and Biochemistry
- Plant Molecular Biology
- Protected Agriculture

Numerous HS and HSE faculty participate in the interdisciplinary Plant Molecular and Cellular Biology Program. Students interested in molecular biology/biotechnology may pursue molecular-oriented studies in any listed specialization. Students interested in full specialization in molecular and related disciplines should contact the Plant Molecular and Cellular Biology interdisciplinary program for specific requirements.

Specializations in the HSE department:

- Breeding and Genetics
- Restoration Ecology
- Floriculture
- Foliage Production
- Plant anatomy and development
- Plant Biotechnology
- Plant Restoration Conservation Biotechnology
- Stress Physiology
- Taxonomy
- Tissue Culture

- Turfgrass Science
- Woody Plants

## Graduate School Degree Program Requirements Master of Science (Thesis Option)

Students must earn at least 30 credits as a graduate student at UF. No more than 9 of the 30 credits (earned with a grade of A, B+, or B) may be transferred from institutions approved for this purpose by the Dean of the Graduate School. A minimum of 12 credits is required in the Horticultural Sciences major; additionally, a maximum of 6 credits in HOS 6971 Research for Master's Thesis (1-15 cr.)- Master's Research - may be counted toward the total credits. See here for information on M.S. graduate degrees (<http://gradcatalog.ufl.edu/graduate/degrees/>).

A minor may be chosen in an academic unit other than the major. If a minor is chosen, at least 6 credits of course work are required in the minor field. Two 6-credit minors may be taken with the major academic unit's permission. A 3.00 (truncated) GPA is required for minor credit. In addition, a representative from the department in which the minor is being received must be on the supervisory committee.

## Master of Science Non-Thesis Option

This option offers additional training beyond the bachelor's degree in a horticultural specialization. Essential elements of this program include a program of courses and a comprehensive written and/or final oral qualifying examination. There is no thesis requirement. A minimum of 30 credit hours of course work is required. Courses taken for program credit must be numbered 5000 or higher with at least 15 of these credits in the Horticultural Science major. With supervisory committee and college dean approval, 6 hours of 3000- or 4000-level undergraduate courses, taught outside the major department, may count toward the minimum requirements for the degree. Click for information on all graduate degrees (<http://gradcatalog.ufl.edu/graduate/degrees/>).

A minor may be chosen in an academic unit other than the major. If a minor is chosen, at least 6 credits of work are required in the minor field. Two 6-credit minors may be taken with the major academic unit's permission. A 3.00 (truncated) GPA is required for minor credit. In addition, a representative from the department in which the minor is being received must be on the supervisory committee.

## Doctor of Philosophy

The Doctor of Philosophy is a research degree and is granted on evidence of general proficiency, distinctive attainment in a special field, and ability to conduct independent investigation as demonstrated in a dissertation presenting original research with a high degree of literary skill. Consequently, doctoral programs are more flexible and varied than those leading to M.S. degree programs. The Ph.D. degree requires at least 90 credits beyond the bachelor's degree, although specific course requirements vary from field to field and from student to student. Up to 30 credits of master's degree may be transferred to a doctoral program. Any credits counted from an M.S. degree program must have been earned within the previous seven years (or by petition). The Graduate Council does not specify the courses required for the Ph.D. degree.

General requirements for the program include

- a clear objective for research
- approval of the student's entire supervisory committee
- an appropriate number of credits of doctoral research

Click for information on all graduate degrees (<http://gradcatalog.ufl.edu/graduate/degrees/>).

## Minor

With the supervisory committee's approval, the student may choose one or more minor fields. Minor work may be completed in any academic unit outside the major, if approved for M.S. or doctoral programs listed in this catalog. The collective grade for courses included in a minor must be "B" (3.00) or higher. If one minor is chosen, the supervisory committee member representing the minor suggests 12 to 24 credits of courses numbered 5000 or higher as preparation for a qualifying examination. Part of this credit may have been earned in the M.S. degree program. If two minors are chosen, each must include at least 8 credits. Competence in the minor area is demonstrated by written examination by the minor academic unit, or by the oral qualifying examination. Minor course work at the doctoral level may include courses in more than one academic unit; if the objective of the minor is clearly stated and the combination of courses is approved by the Graduate School (this approval is not required for a minor in one academic unit). Further requirements for the Master of Science and the Doctor of Philosophy degrees are listed under those headings in the General Information section of this catalog.

## Degrees Offered

### Degrees Offered with a Major in Horticultural Sciences

- Doctor of Philosophy
  - without a concentration
  - concentration in Environmental Horticulture
  - concentration in Horticultural Sciences
  - concentration in Toxicology
- Master of Science
  - without a concentration
  - concentration in Environmental Horticulture
  - concentration in Horticultural Sciences

Requirements for these degrees are given in the Graduate Degrees (<http://gradcatalog.ufl.edu/graduate/degrees/>) section of this catalog.

## Courses

### Horticultural Sciences Program Courses

Code	Title	Credits
ALS 6935	Topics in Biological Invasions	3
BCH 5045	Graduate Survey of Biochemistry	4
BOT 6935	Special Topics	1-4
HOS 6934	Professional Seminar Preparation	1
PLS 5222C	Propagation of Horticultural Crops	3
PLS 5241C	Advanced Plant Micropropagation	4

### Additional Course Offerings

The following courses may be taken to contribute to the overall degree award requirements.

### Botany Courses

Code	Title	Credits
BOT 5225C	Plant Anatomy	4
BOT 5305	Paleobotany	3
BOT 5505C	Intermediate Plant Physiology	3

BOT 5655C	Physiological Plant Ecology	3
BOT 5685C	Tropical Botany	5
BOT 5695C	Ecosystems of Florida	3
BOT 5725C	Taxonomy of Vascular Plants	4
BOT 6566	Plant Growth and Development	3
BOT 6716C	Advanced Taxonomy	2
BOT 6726C	Principles of Systematic Biology	4
BOT 6905	Individual Studies in Botany	1-3
BOT 6910	Supervised Research	1-5
BOT 6927	Advances in Botany	1-3
BOT 6935	Special Topics	1-4
BOT 6936	Graduate Student Seminar	1-2
BOT 6971	Research for Master's Thesis	1-15
BOT 7979	Advanced Research	1-12
BOT 7980	Research for Doctoral Dissertation	1-15
PCB 5046C	Advanced Ecology	3
PCB 5338	Principles of Ecosystem Ecology	3
PCB 5356	Tropical Ecology	3
PLP 6656C	Fungal Biology	4

### Environmental Horticulture Courses

Code	Title	Credits
ALS 5934	Graduate Professional Development Seminar	2
BCH 5045	Graduate Survey of Biochemistry	4
HOS 5117C	Horticultural Plant Morphology and Identification	3
HOS 5432	Advanced Nutritional Management of Ornamental Crops	3
HOS 5515C	Greenhouse and Nursery Operations	3
HOS 5516C	Cultivation, Extraction, and Application of Medicinal Plants and Their Bioactive Compounds	3
HOS 6070	Plant Materials for Conservation and Restoration	3
HOS 6295	Methods in Plant Biotechnology	3
HOS 6523	Research and Development in Turfgrass Science	3
HOS 6905	Problems in Horticultural Science	1-4
HOS 6910	Supervised Research	1-5
HOS 6931	Horticultural Science Seminar	1
HOS 6932	Special Topics	1-4
HOS 6940	Supervised Teaching	1-5
HOS 6941	Practicum in Horticultural Science	2-4
HOS 6971	Research for Master's Thesis	1-15
HOS 6991	Fundamentals of Seed Biology	4
HOS 7979	Advanced Research	1-12
HOS 7980	Research for Doctoral Dissertation	1-15
ORH 5026C	Advanced Annual and Perennial Gardening	3
ORH 5086	Advanced Golf and Sports Turf Management	2
ORH 5282	Orchid Biology and Culture	3
ORH 5817C	Advanced Florida Native Landscaping	3
PLS 5222C	Propagation of Horticultural Crops	3
PLS 5241C	Advanced Plant Micropropagation	4

### Horticultural Sciences Departmental Courses

Code	Title	Credits
ALS 5932	Special Topics	1-4
HOS 5085C	Principles of Postharvest Horticulture	3
HOS 5242	Genetics & Breeding of Vegetable Crops	3

HOS 5330	Postharvest Technologies for Horticultural Crops	2
HOS 5505	Getting Published Horticulture	3
HOS 5555	Tropical Fruit Production and Research in Florida	3
HOS 5711	Phytochemicals in Food & Health	3
HOS 6201	Breeding Perennial Cultivars	3
HOS 6236	Molecular Marker Assisted Plant Breeding	3
HOS 6307	Horticultural Physiology	3
HOS 6331	Postharvest Biology	3
HOS 6345	Environmental Physiology	4
HOS 6355	Root and Rhizosphere Ecology	3
HOS 6412	Nutrition of Horticultural Crops	3
HOS 6545	Advanced Citriculture I	3
HOS 6905	Problems in Horticultural Science	1-4
HOS 6910	Supervised Research	1-5
HOS 6931	Horticultural Science Seminar	1
HOS 6932	Special Topics	1-4
HOS 6934	Professional Seminar Preparation	1
HOS 6940	Supervised Teaching	1-5
HOS 6941	Practicum in Horticultural Science	2-4
HOS 6971	Research for Master's Thesis	1-15
HOS 7979	Advanced Research	1-12
HOS 7980	Research for Doctoral Dissertation	1-15
PCB 5065	Advanced Genetics	4
PCB 5530	Plant Molecular Biology and Genomics	3
PCB 6528	Plant Cell and Developmental Biology	3
PCB 6910	Supervised Research	1-5
PCB 6937	Special Topics in Plant Molecular and Cellular Biology	1-4
PCB 6971	Research for Master's Thesis	1-15
PCB 7922	Journal Colloquy in Plant Molecular and Cellular Biology	1
PCB 7979	Advanced Research	1-12
PCB 7980	Research for Doctoral Dissertation	1-15
PLS 6635	Weed Management for Organic and Sustainable Cropping Systems	3
PLS 7979	Advanced Research	1-12
PLS 7980	Research for Doctoral Dissertation	1-15

## College of Agricultural and Life Sciences Courses

Code	Title	Credits
ALS 5156	Agricultural Ecology Principles and Applications	3
ALS 5905	Individual Study	1-4
ALS 5932	Special Topics	1-4
ALS 6046	Grant Writing	2
ALS 6166	Exotic Species and Biosecurity Issues	3
ALS 6921	Colloquium on Plant Pests of Regulatory Significance	1
ALS 6925	Integrated Plant Medicine	4
ALS 6931	Plant Medicine Program Seminar	1
ALS 6935	Topics in Biological Invasions	3
ALS 6942	Principles of Plant Pest Risk Assessment and Management	3
ALS 6943	Internship in Plant Pest Risk Assessment and Management	1-10
ANS 6936	Graduate Seminar in Animal Molecular and Cell Biology	1-2
BCH 5045	Graduate Survey of Biochemistry	4

FNR 6933	Seminar	1
STA 6093	Introduction to Applied Statistics for Agricultural and Life Sciences	3
STA 6329	Matrix Algebra and Statistical Computing	3

### Student Learning Outcomes

## horticultural sciences (PHD)

#### SLO 1 Knowledge

Describe and explain theories and concepts of the various disciplines of Horticultural Sciences including plant physiology and plant genetics as related to horticultural plant growth and development, and the integration of structure and function of the whole plant

#### SLO 2 Knowledge

Describe new techniques and technologies from associated disciplines

#### SLO 3 Knowledge

Evaluate horticultural systems, components and/or processes to meet industry and societal needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints

#### SLO 4 Skills

Design and conduct experiments required for successful production of fruit and vegetable crops and analyze results

#### SLO 5 Skills

Communicate horticultural ideas, technical data and design information clearly and professionally to other students, scientists and the public

#### SLO 6 Professional Behavior

Display ethical behaviors, cultural sensitivity, teamwork skills and professional conduct

## Horticultural sciences (MS)- Environmental Horticulture

#### SLO 1 Knowledge

Describe and explain theories and concepts the various disciplines of Horticultural Sciences including plant physiology and plant genetics as related to horticultural plant growth and development, and the integration of structure and function of the whole plant.

#### SLO 2 Knowledge

Evaluate and advance horticultural systems, components and/or processes to meet industry and societal needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability

#### SLO 3 Knowledge

Describe techniques and technologies from associated disciplines as applied to Environmental Horticulture

#### SLO 4 Skills

Design, conduct, and evaluate experiments or study required to advance or improve production and/or management of horticultural crops and analyze results

#### SLO 5 Skills

Communicate in written and oral form horticultural ideas, technical data and design information clearly and professionally to other students, scientists and the public

SLO 6 Professional Behavior

Display ethical behaviors, cultural sensitivity, teamwork skills and professional conduct

## **Horticultural sciences (MS)-Horticultural Sciences**

SLO 1 Knowledge

Describe and explain theories and concepts the various disciplines of Horticultural Sciences including plant physiology and plant genetics as related to horticultural plant growth and development, and the integration of structure and function of the whole plant

SLO 2 Knowledge

Describe new techniques and technologies from associated disciplines

SLO 3 Knowledge

Evaluate horticultural systems, components and/or processes to meet industry and societal needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints

SLO 4 HS Skills

Design and conduct experiments required for successful production of fruits and vegetables and analyze results

SLO 5 HS Skills

Communicate horticultural ideas, technical data and design information clearly and professionally to other students, scientists and the public

SLO 6 HS Professional Behavior

Display ethical behaviors, cultural sensitivity, teamwork skills and professional conduct