Horticultural Sciences

Undergraduate Handbook

2015-2016

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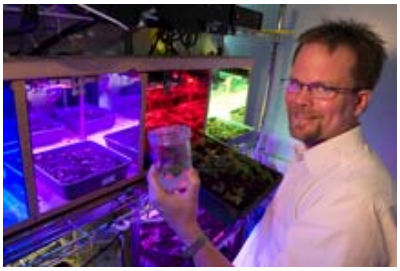

Welcome to the College of Agricultural and Life Sciences, and the Horticultural Sciences Department at the University of Florida. As you will see when you review these materials, the Horticultural Sciences Department offers great opportunities for undergraduates in obtaining an outstanding horticulture/plant science background during their degree program that will lead to exciting opportunities for employment. The department offers a wide variety of undergraduate scholarships and most of our students have received one or more at some point during their undergraduate career here. The Undergraduate Handbook material allows you to get a better understanding of the department and all of the opportunities and other points of interest related to your program. I look forward to my interaction with you and hope I can be of assistance to you any time during your undergraduate degree program and thereafter.

Kevin M. Folta
Chair, Horticultural Sciences

Welcome to the Horticultural Sciences Department at the University of Florida! We offer an outstanding degree program to our undergraduates and we look forward to a close collaboration with you while you are pursuing your degree. We hope you find your experiences here are enriching, rewarding, and fun! This Undergraduate Handbook is provided to orient you about various aspects of the department, your degree program, and opportunities you will encounter while a student in Horticultural Sciences. We urge you to become familiar with the information in this handbook, as it will make your progress through your degree program easier and prevent any missed opportunities! I look forward to meeting and getting to know each of you.

Rebecca Darnell
Undergraduate Coordinator

Table of Contents

Horticulture as a Profession.....1

Horticulture in the U.S. 1

Horticulture in Florida 1

Careers in Horticulture 2

The Horticultural Sciences Program at UF.....2

Minors……..3

Scholarships for Horticultural Sciences Undergraduates.....4

Job Placement in Horticulture.....4

Preparing for the Horticulture Major at UF.....5

Student/Advisor Relationship 6

Student Clubs 7

Internships.....7

Requirements for the B.S. Degree in Horticultural Sciences.....8

Horticultural Sciences Undergraduate Courses……..……8

Horticultural Sciences Undergraduate Advisors 11

Horticulture as a Profession

Have you ever thought about helping to increase the availability of nutritionally important foods to the world market? Are you concerned about the environment? Agricultural sustainability? Organic production? Food safety? Are you interested in improving food crops, either conventionally or through molecular techniques? Does growing, handling, or marketing food crops, or conducting research with these plants sound exciting? Would you like to work to increase fresh fruits and vegetable supply to urban areas in the U.S.? To developing countries? Would you like to teach horticulture, write for a garden magazine, manage a horticultural operation or other horticulturally related agribusiness? If any of these career opportunities sound exciting to you, then consider a degree in Horticultural Science from the University of Florida.

Horticulture is a diverse field, applying principles from biology, math, chemistry, physics, business, and education to grow and use fruits, vegetables, and ornamental crops. Horticulture is unique among agricultural enterprises in that it is an intensive form of agriculture, that is, it requires high inputs and results in high returns. This differs from the extensive forms of agriculture such as the growing of agronomic crops (e.g. wheat, soybean). Success in the science and art of horticulture requires specialized knowledge in both the applied and fundamental sciences, as well as hands-on experience to develop proficiency in understanding plant growth and using this knowledge to enhance plant production. Thus, horticulture is an integrated science, covering the spectrum from fundamental research to technology transfer.

Horticulture in the U.S.

Horticultural crops are excellent sources of carbohydrates, protein, vitamins, minerals, and fiber. As well, many of them contain powerful anti-oxidants that are essential for slowing the degenerative effects in the human body that come with environmental or physical stresses, aging, immune system problems, and more. Approximately 35% of the food consumed today is produced by horticulturalists and the commercial production, processing, and utilization of horticultural crops in the United States is a multi-billion dollar industry. Horticulture production in the U.S. has increased steadily over the past decade, with grapes, apples, oranges, and strawberries topping the list of fruits, while tomatoes and potatoes are the leading vegetables produced. Horticulture is also the number one hobby in the U.S. and the value of home gardens, as well as the impact of businesses catering to the hobbyist, is inestimable. Horticultural production impacts our lives every day, through the food we eat and the functional and aesthetic aspects of our environment.

Horticulture in Florida

Florida is the second largest fruit, vegetable, and juice exporter in the nation, and contributes almost $8 billion to the Florida economy. Citrus is the single major horticulture industry in the state, with an annual value of $1.2 billion. Other high value horticultural crops include tomatoes ($437 million), strawberries ($306 million), bell peppers ($164 million), potatoes ($132 million),

sweet corn ($130 million), watermelon ($80 million), snap beans ($77 million), cabbage ($50 million), squash ($40 million), cucumbers ($65 million), and blueberries ($64 million).

The diversity of climates in Florida and the long growing season make this state especially amenable to production of a wide variety of horticultural crops. Tropical fruits, vegetables, and ornamentals are grown in south Florida, while temperate crops such as peaches, blueberries, and many vegetables are grown in northern Florida. Thus, students have the opportunity to see and learn about the entire range of horticultural crops.

Careers in Horticulture

So what will you do with a degree in Horticultural Science? Careers in horticulture are as varied as the discipline itself. A strong job market awaits our graduates, with generally 2 to 3 job offers per graduate. With a degree in Horticultural Science, you will be prepared for a career in **fruit, vegetable, or nursery/greenhouse production management**. Our curriculum trains you in production management positions in both conventional and the fast-growing **organic food crop industries**. If you gravitate towards business, positions in **technical sales and service** in seed firms, canning and freezing companies, and manufacturers of fertilizers, chemicals, and equipment are available. Or become the **business manager** for one of these companies. **Marketing** of wholesale or retail crops or becoming a **buyer** for government or private institutions or distributors is an exciting career area. You can be a **research biologist**, seeking ways to improve yield and quality of crops and develop methods for handling, storing, and marketing them. Qualified horticulture **teachers** in high school and colleges are needed, as are **county extension agents** and **extension specialists**. Positions in **agricultural communication** are available, where you can write for horticulture magazines, journals, or newspapers. Graduates also have the opportunity to pursue **advanced degrees**, leading to rewarding careers in research, teaching, and/or extension.

The Horticultural Sciences Program at the University of Florida

The Horticultural Sciences Department at the University of Florida - the oldest and largest institution of higher learning in Florida - offers excellent classroom, laboratory, and field facilities. Four undergraduate curricula options are offered by Horticultural Sciences that will enable you to pursue your career goals. If you have a broad interest in horticultural crops, then **Horticultural Science** may suit you. This specialization offers students a generalized program, covering growth and development of horticultural crops. This is a flexible option that can be tailored to individual students' interests and career objectives, ranging from applied production to basic biology. Career options include commodity production/management, research biologist, marketing, agricultural chemical sales, fertilizer sales, produce buyer for grocery stores or restaurants, retail plant sales and a number of other opportunities.

If you are interested in learning about field and/or greenhouse production and management of crops, then you may want to select the commodity specific option, **Horticultural Production**. In

this curriculum, you'll take coursework in specific commodity production techniques, as well as supporting coursework in botany, soils, pest management, and more. This is a comprehensive program for students planning careers in any phase of the fruit and/or vegetable industry. This specialization emphasizes crop production and management. Career options include production management, agricultural sales, marketing, technical representation and many other opportunities.

If you are interested in learning about the latest science behind the production of organic fruits and vegetables, **Organic Crop Production** may be for you. This specialization emphasizes the cultural practices that maintain ecological and economical balance in horticultural crop production systems. This is a flexible option with many electives available to meet education and career objectives. Graduates will be prepared for a range of careers related to conventional, sustainable and organic crop production.

If you like working in a laboratory and developing better quality fruits and vegetables, **Plant Molecular and Cellular Biology** is right for you. This is a comprehensive program focusing on the molecular aspects of crops, including crop growth, development, and cultivar improvement. This specialization is geared towards preparing students for careers in laboratory research and is also an excellent preparation for students wishing to pursue graduate studies.

In all options, faculty comprise the instructional staff in Horticultural Sciences, offering expertise in crop production, organic and sustainable agriculture, physiology, biochemistry, molecular biology, breeding and genetics, protected agriculture, weed science, and postharvest biology. Many courses offer direct field and laboratory experience for students.

Minors

As a Horticultural Sciences student majoring in any option, you can minor in **Plant Molecular and Cellular Biology** or **Organic and Sustainable Agriculture**. The Plant Molecular and Cellular Biology minor is an interdisciplinary minor coordinated by the Horticultural Sciences Department. Coursework includes Lab Methods in Plant Molecular Biology, Horticultural Physiology, and Introduction to Plant Molecular Biology. This minor offers students opportunities for academic training and hands-on experience in current laboratory techniques. Students with a science interest will obtain focused training that will prepare them for graduate school or laboratory positions in the expanding plant biotechnology marketplace.

The Organic and Sustainable Agriculture minor is also an interdisciplinary program administered by the Horticultural Science Department. This minor focuses on organic and sustainable practices in horticulture and plant science, and includes coursework in Organic and Sustainable Crop Production, Alternative Cropping Systems, and Agricultural Ecology. Both minors require a minimum of 15 credit hours.

For students in other majors, Horticultural Sciences offers a minor in **Horticultural Science** for any student interested in fruits and vegetables. Some background courses in botany or plant

science are recommended.

All of the course work necessary for each minor is available online at: http://www.hos.ufl.edu/undergraduate-program/minors or in the undergraduate catalog at: https://catalog.ufl.edu/ugrad/current/Pages/minors.aspx

Scholarships for Horticultural Sciences Undergraduates

The Horticultural Sciences Department has over $40,000 available annually to our undergraduate students. These scholarships are awarded on the basis of scholarship and leadership. All students are urged to apply. Applications are available from the department or on our website and are due by mid-September each year. Application forms are available on-line at: http://www.hos.ufl.edu/undergraduate-program/scholarships at the beginning of each fall semester.

In addition to scholarships available in the Horticultural Sciences Department, the College of Agricultural and Life Sciences (CALS) awards more than $400,000 in scholarships each year. Incoming or currently enrolled students in Horticultural Sciences may submit applications, which are due to the College by March 15. Scholarship application forms can be accessed at: http://cals.ufl.edu/students/scholarships-awards.php

Additional financial aid information is available from the Office for Student Financial Affairs (SFA). Please visit their web site at: http://www.sfa.ufl.edu/.

Job Placement in Horticulture for Graduates

Horticultural Sciences students usually find jobs prior to graduation. Notices of available positions including permanent and internship positions are posted online at: http://www.hos.ufl.edu/career-opportunities and also on our Facebook page at: http://www.facebook.com/HorticulturalSciencesUF Faculty and advisors are also helpful in aiding students in their job search.

The *Career Resource Center* at the University of Florida provides career planning, internship work experience, and employment assistance to students. Services are free and include counseling for students seeking career planning advice, work experience, and job search campaigns. The Career Resource Center and lists of jobs and career information can be accessed at www.crc.ufl.edu

Preparing for the Horticulture Major at the University of Florida

High School Preparation. If you are planning to major in Horticultural Sciences at the University of Florida, you should take courses in biology, algebra, trigonometry, chemistry, and

computer science. You will also need two years of high school foreign language and will need to meet the other admissions requirements of the University of Florida.

Community College. Students must complete an Associate of Arts degree or 60 transferable hours, meet the required grade point average (G.P.A.), complete the required prerequisite courses, and meet the foreign language and immunization policies of the University of Florida before transferring.

Following are the requirements for the four curriculum options in the Horticultural Sciences Department:

Horticultural Production
Horticultural Science
Organic Crop Production
Required G.P.A. = 2.0 overall

Students MUST complete the following courses before transferring:

1. CHM 2045 & 2045L	General Chemistry 1 and Lab
2. BSC 2010 & 2010L	General Biology 1 and Lab
or BOT 2010C	or Introductory Botany
3. BSC 2011 & 2011L	General Biology 2 and Lab
or BOT 2011C	or Plant Diversity
4. MAC 1147	Precalculus
or MAC 1140 & MAC 1114	Precalculus – Algebra and Trig
5. PHY 2004	Applied Physics 1
or PHY 2020	Introduction to Principles of Physics

The following courses may be completed at the community college, but are not required for admission to the College of Agricultural and Life Sciences:

STA 2023 Introduction to Statistics 1
SPC 2608 Introduction to Public Speaking
ENC 2210 Technical Writing
ECO 2023 Microeconomics
or ECO 2013 Macroeconomics

Plant Molecular and Cellular Biology
Required G.P.A. = 2.0 overall
Students MUST complete the following courses before transferring:

1. CHM 2045 & 2045L	General Chemistry 1 and Lab
2. CHM 2046 & 2046L	General Chemistry 2 and Lab
3. BSC 2010 & 2010L	General Biology 1 and Lab
4. BSC 2011 & 2011L	General Biology 2 and Lab

5. MAC 2311	Analytic Geometry and Calculus 1
6. PHY 2048 & 2048L	Physics 1 with Calculus and Lab
or PHY 2053 & 2053L	or Physics 1 and Lab

The following courses may be completed at the community college, but are not required for admission to the College of Agricultural and Life Sciences:

SPC 2608 Introduction to Public Speaking
ENC 2210 Technical Writing
ECO 2023 Microeconomics
or ECO 2013 Macroeconomics

For more information on transferring to UF, please refer to:
http://cals.ufl.edu/students/undergraduate-prospective.php

Student/Advisor Relationship

Students have the responsibility of initiating and maintaining contact with their undergraduate advisor throughout their program in Horticultural Sciences. **You should plan on visiting with your advisor each semester, prior to registering for courses**. Holds are placed on all Horticultural Sciences students prior to registration for each semester, this hold can only be removed by making this appointment. This is very important due to the sequencing and offering times of courses. When you enter the program, make an appointment with the Undergraduate Coordinator, Dr. Rebecca Darnell, to obtain general information about the program and to have an advisor assigned to you. Each semester, make an appointment with your advisor to discuss course selection, academic plans, and interests you wish to incorporate into your program. If course substitutions or waivers are desired, discuss this with your advisor. It is to your advantage to keep in close contact with your advisor and keep them informed of any academic changes or problems you encounter. Usually, problems can be avoided if the advisor is kept apprised of your status.

Student Clubs

The Horticultural Sciences Department has two very active student clubs:

The Gator Citrus Club: The Gator Citrus Club is a multidisciplinary club composed of UF

students and faculty advisors interested in horticultural crops. The primary objective of the Citrus Club is to enhance opportunities for learning agriculture in other areas of the world and to look for ways to improve current agricultural practices at home. The Citrus Club currently has members from several different areas of agriculture, including Horticultural Sciences, Environmental Horticulture, Entomology and Nematology, Agricultural and Biological Engineering, and Food and Resource Economics. They participate in many different activities throughout the year; including the Annual Holiday Citrus Sale; volunteer work at Marjorie Kinnan Rawlings State Historic Site; and participation in the Florida Agricultural Conference and Trade Show (FACTS). The largest event sponsored by the Citrus Club is the annual student trip, paid for by proceeds from the Holiday Citrus Sale. Funds raised from this sale are used to finance student trips to horticultural areas around the world, including Spain, Argentina, and Costa Rica. These trips provide students with a rare educational opportunity to observe not only horticulture in other countries, but also unique social and cultural traditions as well. Visit their web site at: www.hos.ufl.edu/citrusclub/

Organic and Sustainable Agriculture Club: Organic and Sustainable Agriculture Club provides more opportunities for learning and promoting organic farming practices and sustainable food systems. A variety of activities take place throughout the year, including organic farm tours, organic production method demonstrations, participation in the Small Farm conference, collaboration with the Florida Organic Growers organization on community projects, and fund raising with support from the organic industry. Visit their web site at: http://hos.ufl.edu/clubs/organic-gators-club.

There are also numerous student organizations at the University of Florida; a full listing is available at: https://www.union.ufl.edu/involvement/index.asp

Internships

Horticultural Science students are encouraged to complete an internship prior to graduation to gain on-the-job experience. However, internships are required only for the Horticultural Production and Organic Crop Production Specializations. Students may sign up for Practical Work Experience in Horticultural Crops (HOS 4941). Typically, students are placed with a company during the summer months, during which time they are rotated through a variety of different jobs to give them as diverse an experience as possible. In addition to the monetary earnings provided by the company, students earn 1 credit hour for every month of full-time employment. Internship positions are posted on the online at: http://www.hos.ufl.edu/career-opportunities. Students should consult with their advisor for registration and forms.

Requirements for the B.S. Degree in Horticultural Sciences

The B.S. degree requires 120 credits - 60 credits in General Education/College of Agricultural & Life Sciences and 60 credits in the Horticultural Sciences major. Requirements in the major vary by specialization. Course requirements for each specialization can be found online at:

https://catalog.ufl.edu/ugrad/current/agriculture/majors/horticultural-science.aspx and curriculum sheets for each specialization can be found at: http://www.hos.ufl.edu/undergraduate-program/curriculum-options

Horticultural Sciences Undergraduate Courses

FRC 1010 - Growing Fruit for Fun and Profit. S
1 credit. Instructor: Staff.
Especially for non-majors who desire a concise mini-course in fruit growing and marketing. Fruit crops include citrus, pecan, blueberry, strawberry, peach, grape, apple, mango and avocado.

FRC 3212 - Introduction to Citrus Culture and Production. F odd years
3 credits. Instructor: Dr. Jose Chaparro
Citrus botany, scion and rootstock selection, site selection, fruit quality grove design and production practices.

FRC 3252 - Tropical and Subtropical Fruits. F even years
2 credits. Instructor: Dr. Jose Chaparro
Culture and management of important tropical and subtropical fruit, including avocado, banana, mango, papaya, loquat, persimmon, pineapple, coffee and others.

FRC 3274 - Tree and Small Fruit Production. F odd years
3 credits. Instructor: Dr. Jeff Williamson
Current principles and cultural practices in deciduous tree, bush and vine crops. Major emphasis will be on practical aspects of production.

HOS1014 - Vegetable Gardening. F
1 credit. Instructor: Dr. Saba Rathinasabapathi
A course primarily for non-majors who desire to learn the basic principles of vegetable gardening. A garden will be required of each student.

HOS 3020 - Principles of Horticultural Crop Production. F
3 credits. Instructor: Dr. Xin Zhao & Dr. Mercy Olmstead
Provides a basic understanding of the world fruit and vegetable industry. Emphasizes world, U.S. and Florida production regions, biology, soils, nutrition, terminology, types of fruits and vegetables, site selection and more.

HOS 3222C - Greenhouse and Protected Agriculture. S even years
3 credits. Instructor: Staff
The principles and practices of crop production in protected structures. Structure type, media, fertilization and pest control practices emphasized.

HOS 3281C - Organic & Sustainable Crop Production. F
3 credits. Instructor: Dr. Xin Zhao
Concepts/techniques of organic & sustainable production of horticultural crops, including soil/water management, pest control, harvest, handling & marketing.

HOS 3305 - Introduction to Plant Molecular Biology. F
3 credits. Instructor: Dr. Eduardo Vallejos
Prereq: APB 2150, BOT 2010C or BSC 2010
Introduction to plant molecular biology and genetic engineering, emphasizing plant genes and genomes, transformation of plants and basic molecular biology.

HOS 3430C - Nutrition of Horticultural Crops. S of odd years
3 credits. Instructor: Dr. David Liu
Study and discussion of physiological, biochemical and environmental factors influencing nutritional status & productivity of horticultural crops.

HOS 4283C - Advanced Organic & Sustainable Crop Production. S
3 credits. Instructor: Dr. Xin Zhao
Intensive examination of the methods & techniques necessary for organic and sustainable production of marketing of horticultural products.

HOS 4304 - Horticultural Physiology. F
3 credits. Instructor: Dr. Rebecca Darnell
Basic concepts and processes of physiology as they relate to plant growth and development.

HOS 4313C - Laboratory Methods in Plant Molecular Biology. F
2 credits. Instructor: Dr. Eduardo Vallejos
Prereq: AGR 3303 or HOS 3305 and PCB 3063
Hands-on laboratory experience in plant molecular biology. Utilizing current techniques for isolation, purification and cloning of plant DNA, students learn many basic techniques in plant biotechnology.

HOS 4341 - Advanced Horticultural Physiology. S
3 credits. Instructor: Dr. Rebecca Darnell
Environmental effects (light, temperature and water) on physiology, growth and development of plants.

HOS 4905 Independent Study in Horticultural Science. F, S, SS
Credits: 1 to 6.
Selected research topics in molecular biology, physiology and/or genetics of horticultural crops.

HOS 4911 Supervised Research in Horticultural Sciences. F, S, SS
Credits: 0 to 3; can be repeated with a change in content up to 6 credits.
Firsthand, authentic research in horticultural sciences under the supervision of a faculty member. Projects may involve inquiry, design, investigation, scholarship, discovery or application. (S-U)

HOS 4915 Honors Thesis Research in Horticultural Sciences. F, S, SS
Credits: 0 to 3; can be repeated with a change in content up to 6 credits. Prereq: junior standing, upper division GPA of 3.75 or higher and completed honors thesis proposal on file.
Independent research in horticultural sciences leading to an honors thesis. Student will be

mentored by a faculty member. Projects may involve inquiry, design, investigation, scholarship, discovery or application. (S-U)

HOS 4932 - Special Topics in Horticultural Sciences. F, S, SS
1-3 Variable credit
Critical review of selected topics in specific areas not covered in other Horticultural Sciences courses.

HOS 4933 - Professional Development in Horticulture. S
1 credit. Instructor: Rebecca Darnell
Professional skills development, including job searching, resume writing, interview skills, professional etiquette, communications, and salary negotiations.

HOS 4941 - Practical Work Experience. F, S, SS
1-4 Credits
Practical work that must be a new experience and related to the field of study. (S-U)

VEC 2100 -World Herbs and Vegetables. F, SS (B)
3 credits. Instructor: Dr. Saba Rathinasabapathi
Introduces students to a variety of vegetables and culinary herbs. Emphasis placed on genetic, phytochemical and botanical diversity and importance of food phytochemicals and role of vegetables in nutrition.

VEC 3221C - Commercial Vegetable Production. F
4 credits. Instructor: Dr. Saba Rathinasabapathi
Principles and practices of successful commercial vegetable production will be presented, including crop requirements, growth patterns, production techniques, consumption/marketing patterns, and US/FL production areas. The lab involves field trips and guest speakers from the industry.

Courses in Landscape and Nursery Horticulture are offered by the Environmental Horticulture Department.

Horticultural Sciences Undergraduate Advisors

Name	**Office number**	**Phone/email**
Dr. Rebecca Darnell, Undergraduate Coordinator	1131 Fifield Hall	352-273-4789/rld@ufl.edu

Mr. Curtis Smyder Advisor	1503 Fifield Hall	273-4781/curtisr@ufl.edu
Dr. Xin Zhao Advisor	1235 Fifield Hall	352-273-4773/zxin@ufl.edu