

**HLTSBS Program Assessment Report
Horticulture Department
University of Arkansas
Academic Year 2022-2023**

Department of Horticulture

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Department Mission

The mission of the Department of Horticulture at The University of Arkansas is to conduct applied and basic research and support and enhance the Arkansas horticulture industries and to conduct high quality teaching and student research programs leading to B.S., M.S. and Ph.D. degrees in a diverse, equitable, and inclusive environment. Our department head and dedicated faculty and staff have set specific goals for executing our mission.

Program Goals

The goal of the Department of Horticulture is to serve the people of Arkansas and assist the nation and the world through education, research, and service. Through dedicated teaching, pursuit of knowledge and interaction with society, we seek to improve our contributions to the general welfare. The Department of Horticulture has, as perhaps no other department, a goal to create quality of life for all citizens – economic, aesthetic, and social well-being by educating students in horticultural and turfgrass sciences, conducting research that makes a difference, and to communicate those findings to industry and the public.

General Learning Outcomes Being Assessed in This Report:

Written Communication Skills – Written communication is the development of ideas in writing. Written communication involves learning to work in many genres and styles. Written communication abilities develop through iterative experiences across the curriculum.

Oral Communication Skills - Oral communication is a prepared, purposeful presentation designed to increase knowledge, to foster understanding, or to promote change in the listeners' attitudes, values, beliefs, or behaviors.

Critical Thinking Skills – The comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.

Horticulture Specific Skills - Appreciate and communicate the diverse impacts of horticulture on people and culture.

Assessment Measures for General Skills:

Student Learning Outcome – Written Communication

- (1) Achievement will be assessed using a written communication rubric on the required reflective essay where the student has reflected on the impact of previous course work on preparation for the internship experience.
- (2) This is a direct measure of student learning

Student Learning Outcome – Oral Communication.

- (1) Achievement will be assessed using an oral communication rubric during oral presentations where the student has compiled and evaluated the scientific literature as part of a class project and/or completed an independent research project as part of a special problems, research project or internship class.
- (2) This is a direct measure of student learning.

Student Learning Outcome – Critical Thinking Skills

- (1) Achievement will be measured using a critical thinking VALUE rubric included in the department assessment plan.
- (2) This is a direct measure of student learning.

Assessment Measures for Discipline Specific Skills:

Discipline Specific Skills Student Learning Outcome 4: Appreciate and communicate the diverse impact of horticulture on people.

Goal 1: Describe the various ways plant impact human well-being (mental, psychological, and restorative, physical, medicinal).

Goal 2: Describe and assess the influence of plants and their management on environmental sustainability, habitat restoration or low-impact development.

Goal 3: Quantify the economic importance of horticultural food crops in food systems.

Goal 4: Describe the social, spiritual, and cultural importance of plants to historical and contemporary communities.

Goal 5: Understand the connection between plants and diverse peoples for food, fiber, medicinal, and spiritual-faith systems.

Methodology:

For this report two courses are assessed. HORT 1103 Plants, People, and You (3 hrs.) and HORT 472V (2 hrs.) HTLS Internship Assessment. HORT 1103 is a horticulture discipline survey course open to all majors at the University. Each lecture period covers a different topic representing the breadth of the horticulture discipline on humankind. It is a designated general education elective and falls under the student learning outcomes 4.1 Intercultural/Global and 4.2 Diversity. HORT 1103 is taught both in the fall and spring semesters. HORT 472 V is our capstone course composed of upper-level students, normally seniors within their last two semesters of completing their degree. This is the first academic assessment year where HORT 472V was independent of HORT 462V which is the Internship Experience component of the core internship program requirement. HORT 472V is now the capstone course used for the departmental assessment to satisfy the General Education Capstone Course Requirement 6.1.

As required, HORT 472V will be assessed yearly going forward. HORT 1103 Plants, People, and You has not been assessed in the past.

HORT 1103 Plants, People, and You was assessed using the Horticulture Discipline Specific Skills: Learning Outcome 4. Appreciate and communicate diverse impacts of horticulture on people. Data were used from the fall and spring semester of the 2022-2023 academic year with supporting data from 2019 to illustrate changes made to the lecture content.

HORT 472V Internship Assessment was assessed using the General Outlook Skills Student Learning Outcomes 1: Written Communication Skills. 2: Oral Communication Skills, and 3: Critical Thinking Skills. Data were used from the fall 2022 semester.

Written Communication Component Assessed:

HORT 472V HTLS Internship Assessment: As part of the assessment requirement, students are required to prepare a 1500-word reflective essay as part of university requirements. The essay is intended as a reflection on how the student's classes taken prior to the internship prepared them for their internship. Conversely, it can also identify gaps in course content and the overall curriculum. The internship coordinator and/or internship advisor assess the written reports and identify areas of strength and weaknesses. The overall average score is reported in Table 1. Specific recommendations will be incorporated into the Summary of Findings section of this report.

Oral Communication Skills Assessed:

HORT 472V HTLS Internship Assessment: Students are required to prepare a professional oral seminar based on their internship experience. The expected duration is about 12 minutes and 3 minutes for questions. Three faculty members were randomly asked to evaluate and score each undergraduate presentation using a grading rubric developed to match the assessment plan criteria. The overall average score is reported in Table 1.

Critical Thinking Skills Components Assessed:

HORT 472V HTLS Internship Assessment: Students are required to apply scientific methods and hypothesis testing to their internship experience and activities. Students are expected to demonstrate competencies in activities related to the internship experience. The overall average score is reported in Table 1.

Acceptable and Ideal Targets for the General Outcome Skills: Student Learning Outcome -Written Communication.

- (1) Acceptable target: Graduating students must demonstrate skills in the continuum between Milestones 2 and 3 in the student learning outcomes for written communication, oral communications and critical thinking outlined in the rubrics.
- (2) Ideal target: Students will be able to demonstrate skills outlined in the Level 4 (Capstone) for oral communication.

Acceptable and Ideal Targets for the General Outlook Skills: Student Learning Outcome-Oral Communication.

- (1) Acceptable target: Graduating students must demonstrate skills in the continuum between Milestones 2 and 3 in the student learning outcomes for written communication, oral communications and critical thinking outlined in the rubrics.
- (2) Ideal target: Students will be able to demonstrate skills outlined in the Level 4 (Capstone) for oral communication.

Acceptable and Ideal Targets for the General Outlook Skills: Student Learning Outcome-Critical Thinking Skills.

- (1) Acceptable target: Graduating students must demonstrate skills in the continuum between Milestones 2 and 3 in the student learning outcomes for critical thinking outlined in the rubrics.
- (2) Ideal target: Students will be able to demonstrate skills outlined in the Level 4 (Capstone) for oral communication.

Acceptable and Ideal Targets for the Discipline Specific Skills: Student Learning Outcome – Horticulture Discipline Specific Skills.

- (1) Acceptable target: At the end of the course, students must demonstrate skills in the continuum between Levels (Milestones) 2 and 3.
- (2) Ideal target: Students will be able to demonstrate skills outlined in Levels 4 (Capstone).

Information on Benchmarks and rubrics used are included in Attachments 1-4 at the end of this report.

Summary of Findings:

General Learning Outcomes:

Eight students were assessed during the fall semester. Data on HORT 472V are reported in Table 1. All students reached the acceptable benchmark (2 to 3) with 6 students reaching level 4 (Capstone) for written communication and critical thinking skills. One student failed to meet the benchmark 2 level of acceptability for the oral component. The assessment rating for oral communication was 2.75 compared to 3.65 from last year's rating. All student oral presentations were held during the regularly scheduled seminar period for the Horticulture Department. The fall's seminar series were all held remotely via Zoom by instructor choice and did not allow the opportunity for students to fully practice their presentations before delivery.

Horticulture Discipline Specific Skills:

Students assessed in HORT 1103 Plants, People, and You ranged from true freshmen horticulture majors to graduating seniors from all academic colleges at the U of A. Summarized data for HORT 1103 are given in Tables 2, 3, and 4. For the two semesters assessed this academic year, both classes met the acceptable target goals as defined in the Horticulture Department Assessment Plan (Table 2 and Table 3).

Prior to 2019, HORT 1103 was not a general education elective. This course was added in 2019 to the general education curriculum to meet the University mandated student learning outcomes 4.1 Intercultural/Global and 4.2 Diversity requirement. To incorporate the requirements course content was added to address culture and diversity topics. Table 4 shows the increase in the number of diversity or culturally related lectures added after 2019. Table 5 lists lecture topics and relevancy for the spring 2023 semester.

Table1. Overall assessment data covering written, oral, and critical thinking components for student learning outcome scoring data for HORT 472V Internship Assessment during the fall semester of the 2022-2023 academic year.

Course Assessed	Number of Students Assessed	Overall Average Assessment Score*	Minimum Score Assessed	Maximum Score Assessed
Written Communication Component	8	3.62	2.0	4.0
Oral Communication Component	8	2.75	1.5	4.0
Critical Thinking Component	8	3.00	2.0	4.0

*Average assessment score for this course is the overall course average based on a rubric rating scale of 0 (does not meet minimum student learning outcome goals for the written, oral, or critical thinking component, or the student failed to present a seminar for assessment) to 4 (mastery of the student learning outcome goals for written, oral, or critical thinking component).

Table 2. Horticulture Discipline Specific Skills student learning outcome scoring data for HORT 1103 Plants, People, and You for the fall semester 2022 (n= 147 students).

Benchmark Level Distribution	Number of students at this benchmark	Percentage of class at this benchmark
Benchmark 4	94	63.9%
Benchmark 3	44	29.9 %
Benchmark 2	3	0.02%
Benchmark 1	1	0.01%
Benchmark 0	4	0.02%

Percentage assessment score for this course is the overall course average based on a rubric rating scale of 0 (does not meet minimum student learning outcome goals) to 4 (mastery of the student learning goals for discipline specific skills).

Table 3. Horticulture Discipline Specific Skills student learning outcome scoring data for HORT 1103 Plants, People, and You for the spring 2023 (n= 167 students).

Benchmark Level Distribution	Number of students at this benchmark	Percentage of class at this benchmark
Benchmark 4	75	44.9 %
Benchmark 3	58	34.7 %
Benchmark 2	23	13.7%
Benchmark 1	6	0.35 %
Benchmark 0	5	0.03 %

Percentage assessment score for this course is the overall course average based on a rubric rating scale of 0 (does not meet minimum student learning outcome goals for discipline specific skills) to 4 (mastery of the student learning goals for discipline specific skills).

Table 4. Data on Topics Encompassing Diversity and Culture from HORT 1103 Plants, People, and You. Data from 2019 and from the Fall 2022 and Spring 2023 Academic Year.

Semester	Total Number of Lectures	Number of Diversity and Culture Lecture Topics	Percentage Of Class Lectures
Fall 2019*	30	3	10%
Fall 2022	29	5	17%
Spring 2023	26**	5	19%

* Fall 2019 was prior to adding identifiable diversity and culture lectures to the schedule.

**Spring 23 lost 3 lecture periods because of campus being closed for weather of which 1 was a lecture related to culture.

Table 5. A List of Diversity and Culture Lecture Titles from the Spring 2023 HORT 1103 Plants, People, and You Semester with the Content Area and Relevancy.

Lecture Title	Content Area	Relevancy
Great Gardens of the World	World Culture	How various cultures have contributed to the human aesthetic
Chili Peppers of the Americas	Culture and Food	How cultures around the world have adopted and adapted introduced plants into those cultures
Ethnobotany of the Southern Great Plains	Indigenous Culture	The use of indigenous plants for food, fiber, and medicine in First American culture
Centers of Crop Domestication	Diversity/World Culture	How differing cultures worldwide domesticated useful plants based on local physiography and climate
Sioux Chef	Indigenous Culture	First Americans adapting traditional food crops to modern society

Recommendations / Actions

HORT472V Internship Assessment: General Student Learning Outcomes.

It is recommended that at least the undergraduate internship assessment scheduled seminars be held face to face instead of remote to improve oral communication skills. It is also recommended that personnel and resources be detailed to better prepare students for the seminar presentation and written skills if needed. With the caveat that most students have not completed courses for their degree program before undertaking an internship, students indicate that they generally felt well-prepared for their internship experiences. One student indicated that their internship experience convinced them that their career path was not what they wanted to do going forward.

HORT 1103 Plants, People, and You: Horticulture Discipline Specific Skills.

The average number of lectures focusing on topics related to diversity or an intercultural/global focus was 19% of the total lectures. No guidelines are given from the university undergraduate council on the number of lectures recommended to fulfill goals 4.1 and 4.2 but 15 to 20% seems adequate for a course that must cover many horticulturally related topics in one semester. It is recommended that the speaker/topic base be enlarged to ensure that a suitable number of speakers are available each semester.

ATTACHMENT 1

Table 2. Oral Communication VALUE Rubric: The definition of oral communication is a prepared, purposeful presentation designed to increase knowledge, to foster understanding, or to promote change in the listeners' attitudes, values, beliefs, or behaviors (*for more information, please contact value@aacu.org*).

	Capstone 4	Milestones		Benchmark 1
		3	2	
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the

	supports the presentation or establishes the presenter's credibility/authority on the topic.	establishes the presenter's credibility/authority on the topic.	establishes the presenter's credibility/authority on the topic.	presentation or establishes the presenter's credibility/authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced, but is not explicitly stated in the presentation.

**Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.*

ATTACHMENT 2

Table 3. Critical Thinking VALUE Rubric: The definition of critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion, and can be demonstrated in assignments that require students to complete analyses of text, data, or issues (*for more information, please contact value@aacu.org*).

	Capstone 4	Milestones		Benchmark 1
		3	2	
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective,	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.

	thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	(perspective, thesis/hypothesis).		
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

**Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.*

ATTACHMENT 3

TABLE 4. HORTICULTURE DISCIPLINE SPECIFIC SKILLS RUBRIC: After completing the Horticulture B.S. students will have a technical Knowledge of horticulture, professional skills of communication, leadership, computing, critical thinking, problem solving, business, and analysis, and have perspectives related to horticulture.

Discipline Specific Skills	Level 1	Level 2	Level 3	Level 4
Acquire, integrate, and apply knowledge of plant science to managed systems	Develop working knowledge of multiple sources, including current and older literature, to find, evaluate, organize, and manage information related to horticultural systems.	Demonstrate competence with both laboratory and field-based technologies used in modern horticulture.	Apply concepts of plant biology, systematics, ecology, and genetics to manage and improve plants and their products.	Apply scientific methods to test hypothesis.
Demonstrate interdisciplinary knowledge and competency in managing horticultural system.	Assess soils, soil health, plant fertility, water and site limitations.	Assess potential and evaluate realized interactions with the abiotic and biotic environment in which plants are grown.	Recommend and use appropriate application methods, materials, and diagnostic skills for addressing soil constraints and irrigation, nutrient, stress, and pest management issues.	Apply principles of accounting, business law, labor, marketing and personnel management to a horticultural business and contribute to developing the various components of a business plan.
Synthesize knowledge and use insight and creativity to better understand and improve plant systems.	Anticipate and recognize problems, identify causes of those problems, identify viable solutions to the problems and evaluate actions and consequences of treatments and interventions.	Develop, identify and employ best management practices that lead to sustainable solutions and outcomes.	Understand how global issues including climate change, energy use, water availability, and/or food safety impact on sustainability of horticultural systems locally, regionally and globally.	
Appreciate and communicate the diverse impacts of horticulture on people.	Describe the various ways plants impact human well-being (mental: psychological and restorative; and physiological).	Describe and assess the influence of plants and their management on environmental sustainability habitat restoration or low-impact development. Quantify the economic importance of plants in managed ecosystems and the impact of horticultural crops in food system.	Describe the social, spiritual and cultural importance of plants to historical and contemporary communities of people.	Communicate effectively with various audiences using oral, written and visual presentation skills and multi-media techniques
Demonstrates professionalism and proficiency in skills that relate to horticulture.	Acquire knowledge of a range of cultures, values, and political perspectives relevant for living in a global community.	Demonstrate a high level of personal and social responsibility.	Demonstrate leadership and the ability to collaborate and work in teams.	Plan, engage and learn from actions that demonstrate civic responsibility to community and society. Develop a plan for life-long learning as it relates to career choice and professionalism.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet Level 1 performance.

ATTACHMENT 4

Table 5. Benchmarks for achieving discipline specific skills.
 Modified from: Pritts, M.P. and T. Park. 2013. Proposed Learning Outcomes for Four-year Horticulture Programs in the United States. HortTech. 23(2): 237-240.

Goals	Benchmarks			
	4	3	2	1
Learning outcome 1: Acquire, integrate, and apply knowledge of plant science to managed systems				
Goal 1. Use multiple sources, including current and older literature, to find, evaluate, organize, and manage information related to horticultural systems.	Publish an article on a plant based system with a thorough literature review.	Write a thorough literature review about a specific topic for classroom credit.	Write a term paper utilizing primary resources related to a horticultural topic.	Be able to identify primary and secondary information sources and differentiate between referred and non-referred sources.
Goal 2. Demonstrate competence with both laboratory and field-based technologies used in modern horticulture.	Present research findings at regional or national meetings / competitions.	Participate in faculty directed research programs incorporating laboratory or field technology.	Gain competence operating laboratory/ field technology through internships or work-related activities.	Perform laboratory exercises using laboratory equipment/ technology in horticulture courses.
Goal 3. Apply concepts of plant biology, systematics, ecology, and genetics to manage and improve plants and their products.	Conduct capstone research projects related to genetics, plant breeding, genomics, plant identification, and cultivar performance.	Develop a plant selection guide for use in specific horticultural systems as part of an in-class assignment.	Complete courses in fruit/vegetable crops, or landscape/ turf management and understand the selection and appropriate use of plant species or cultivars unique to those courses.	Complete at least one course in plant identification, taxonomy/systematics or genetics.
Goal 4. Apply scientific methods to test hypotheses.	Write, submit to peer or instructor evaluation, defend, a capstone research thesis. Give a public presentation of the work.	Write a research proposal and conduct a research project leading to a published or presented paper.	Write a research proposal and conduct a research project leading to a summary paper as a special topic.	Conduct classroom laboratory experiments with hypothesis testing, data collection and analysis and conclusions.
Learning outcome 2: Demonstrate interdisciplinary knowledge and competency in managing horticultural systems				
Goal 1. Assess soils, soil health, plant fertility, water, and site limitations.	Conduct capstone or special problems research related to soil-plant interaction, plant nutrition, plant-water relations including abiotic	Participate in projects related to landscape management, or crop production practices. Internship focus on soil management, soil	Complete classes that include site analysis and management for crop production systems. Complete classes in landscape planning	Complete a soil science or soil physics course.

Goals	Benchmarks			
	4	3	2	1
	stress on site management.	fertility, site assessment and design, or irrigation management.	and landscape/turf management which includes site assessment.	
Goal 2. Assess potential and evaluate realized interactions with the abiotic and biotic environment in which plants are grown	Conduct a capstone or special problems research project focused on plant-pest interactions or abiotic stressors.	Complete assigned classroom projects developing integrated pest management strategies.	Identify key insect pests and diseases associated with limitations to plant growth and development. Identify abiotic factors critical in production and landscape/turf management systems.	Complete principles of horticulture course. Complete courses in entomology, weed science or plant pathology.
Goal 3. Recommend and use appropriate application methods, materials, and diagnostic skills for addressing soil constraints and irrigation, nutrient, stress, and pest management issues	Complete a capstone or special problems research project related to soil management, remediation, landscape management, crop fertility, or pest management.	Participate in an internship focused on substrate/soil or pest management, irrigation design/ installation or product testing and sales.	Complete classroom projects in soil/substrate management, soil fertility and applying fertilizers, irrigation design and management, plant protection strategies and schedules.	Complete classes in principles of horticulture, soil science, soil fertility, entomology, weed science, or plant pathology. Student complete class in landscape management, greenhouse management, fruit production or vegetable production.
Goal 4. Apply principles of accounting, business law, labor, marketing, and personnel management to a horticultural business and contribute to developing the various components of a business plan.	Conduct a capstone or special problems research project developing a business plan for a start-up horticultural enterprise.	Conduct classroom projects related to developing the various components of a business plan.	Understand business models. Develop start-up and financing strategies, personnel management policies, marketing and sales strategies.	Complete courses in business management, business law, finance, marketing or entrepreneurship
Learning outcome 3: Synthesize knowledge and use insight and creativity to better understand and improve plant systems				
Goal 1. Anticipate and recognize problems, identify causes of those problems, quantify potential impacts, analyze options, identify viable solutions to the problems, and evaluate actions and consequences of treatments and interventions	Conduct a capstone or special problems research project related to testing or proposing a management system.	Participate in a service learning activity related to horticulture involving a multi-faceted approach to system management.	Complete classroom assignments related to critical analysis and decision making protocols on production or management systems.	Complete courses in plant pathology, entomology, weed science, soil fertility, landscape/turf management or controlled environments.
Goal 2. Develop, identify, and employ best management	The SUST minor capstone project is a horticulture related	Enroll in and complete the SUST or ENSC minor.	Complete a project or term assignment related	Complete a course related to horticultural or system sustainability.

Goals	Benchmarks			
	4	3	2	1
practices that lead to sustainable solutions and outcomes.	project; project is presented to the department.		to sustainable management plan development; develop a best practices management plan.	
Goal 3. Understand how global issues including climate change, energy use, water availability, and/or food safety impact the sustainability of horticultural systems locally, nationally, and globally.	Complete a SUST capstone project, an honors project, or special topic research project related to climate change, and the FEWS nexus of horticulture production.	Enroll in and complete the SUST or ENSC minor.	Complete a project or term assignment related to the impacts of climate change on horticulture production systems.	Complete a course related to horticultural or system sustainability.
Learning outcome 4. Appreciate and communicate the diverse impacts of horticulture on people				
Goal 1. Describe the various ways plants impact human well-being (mental: psychological and restorative; physical: medicinal and physiological).	Complete a research project investigating the relationship or influence of horticulture on human well-being.	Participate in a service learning project focused on human-plant interaction or recreational or sports fields.	Complete a course in environmental sociology or ethno-horticulture.	Complete a general survey class in horticulture.
Goal 2. Describe and assess the influence of plants and their management on environmental sustainability, habitat restoration or low-impact development (LID).	Complete a capstone project, honors project or special research project related to sustainability, habitat restoration or low-impact development.	Participate in classroom projects focused on sustainable practices and implementation.	Complete a course in environmental restoration, ecosystem assessment or landscape/turf management.	Complete a class assignment or learning module focused on restoration or sustainable practices related to horticulture.
Goal 3. Quantify the economic importance of plants in managed ecosystems and the impact of horticultural crops in food systems.	Complete a capstone project, honors project or special problems course investigating the production and post-harvest economics of a horticultural food crop.	Complete a written or visual presentation comparing and contrasting various worldwide food production systems focusing on horticultural crops.	Complete a course in environmental economics or food and agricultural marketing.	Complete a learning module focused on economically important food crops and associated production and distribution systems.
Goal 4. Describe the social, spiritual, and cultural importance of plants to historical and contemporary communities of people.	Complete and present a capstone, honors or special problems project investigating in role of plants in human culture.	Write a research paper on a specific culture or community and how plant interaction and use affected or influenced that culture.	Complete a learning module on the role of ornamental, spiritual and medicinal plants in early and modern human culture.	Complete a general survey class in horticulture.
Goal 5. Communicate effectively with	Create and publish content on a	Prepare and present horticulturally	Complete a project or term	Complete a communication intensive course.

Goals	Benchmarks			
	4	3	2	1
various audiences using oral, written, and visual presentation skills, and contemporary networking/social media technologies.	horticulture related topic using digital media.	related content at a professional or industry meeting/ conference.	assignment which is presented orally, written or through digital media.	
Learning outcome 5. Demonstrate professionalism and proficiency in skills that relate to horticulture				
Goal 1. Acquire knowledge of a range of cultures, values, and political perspectives relevant for living in a global community.	Complete a study abroad experience or international internship.	Participate in a department or college associated international travel opportunity.	Complete a research paper on a topic associated with human-plant interactions and the effect on culture.	Complete a course in world or regional geography.
Goal 2. Demonstrate a high level of personal and social responsibility.	Leadership position in a collegiate organization involved in local community interactions.	Develop an action plan using horticulture to engage a local or regional community.	Complete a research project investigating the role of horticulture in modern urban and rural society.	Complete a humanities course in ethics or social work.
Goal 3. Demonstrate leadership and the ability to collaborate and work in teams.	Election to a regional or national undergraduate organization associated with a professional society.	Leadership position in a student club or university related organization.	Active participation in an undergraduate related club or collegiate organization.	Demonstrate leadership in class group projects or team building activities.
Goal 4. Plan, engage, and learn from actions that demonstrate civic responsibility to community and society.	Propose, design and implement a project relating to a socio-horticulture topic such as a community/school garden or horticulture therapy program.	Write a research paper evaluating the effectiveness and/or impact of a school or community garden on the targeted community.	Complete a course with a service learning component.	Complete a course module on horticulture-based outreach activities, opportunities and responsibilities on a local, regional or national level.
Goal 5. Develop a plan for life-long learning as it relates to career choice and professionalism.	Postgraduate involvement and leadership in professional or trade organizations.	Participate in regional or national professional meetings as an undergraduate.	Participate in extracurricular activities; attend seminars, trade shows or industry meetings relating to a career choice.	Student membership in a profession-related organization.