

**Board of Governors Staff Analysis:  
Ph.D. in Plant Breeding  
University of Florida  
REVISED 4/22/2021**

<b>Program</b>	Ph.D. in Plant Breeding
<b>CIP Code</b>	01.1104
<b>Institution</b>	University of Florida
<b>Proposed Implementation Date</b>	Fall 2021
<b>Staffed By</b>	Jeremy M. Hudak
<b>Initial Review Date</b>	2/11/2021

**Projected FTE and Headcount**

	Student Headcount	Student FTE
<b>Year 1</b>	5	3.5
<b>Year 2</b>	10	7.25
<b>Year 3</b>	15	11
<b>Year 4</b>	20	14.5
<b>Year 5</b>	20	14.5

**Projected program costs**

Total		Percentage & Dollar Amount					Auxiliary Funds	Cost per FTE	SUS 19-20 Average Cost per FTE
		Current Reallocated	New Recurring	New Non-Recurring	Contracts & Grants	Philanthropy & Endowment			
<b>Year 1</b>	\$273,935	44% \$120,657	0% \$0	0% \$0	12% \$33,278	44% \$120,000	\$0	\$34,473	\$22,940 01 CIP
<b>Year 5</b>	\$1,026,090	33% \$336,027	0% \$0	0% \$0	20% \$210,063	47% \$480,000	\$0	\$23,174	

**Proposal Page Numbers**

INTRODUCTION		ACCOUNTABILITY		READINESS				
Program Description	BOG Goals	Overall	Budget	Mission & Strength	Program Quality	Curriculum	Faculty	Resources
2	4-5	6-10	10-13	15-18	18-19	19-27	27-31	31-35

## A. Program Description

The University of Florida (UF) is proposing a new Ph.D. in Plant Breeding under CIP 01.1104. The proposed degree program, administered through a collaborative effort by the four academic departments that comprise the UF Institute of Food and Agricultural Sciences' (IFAS) College of Agricultural Life Sciences, is designed to prepare graduates for career opportunities in the agricultural industry and within academia. Developed in consultation with industry, non-profit, and academic partners, the curriculum will provide students with training in traditional and contemporary breeding methodologies, including molecular techniques (e.g., genomic prediction and genome editing), quantitative genetics, and breeding trials. The institution intends to charge \$528.69 per credit hour for resident students and \$1,218.90 per credit hour for non-resident students.

The proposed Ph.D. in Plant Breeding will require a total of 90 credit hours beyond the completion of a baccalaureate degree and the successful defense of a dissertation. Individuals admitted to the program with a master's degree may petition UF/IFAS to transfer up to 30 credit hours of graduate-level coursework from a regionally accredited institution. Students must complete a minimum of 40 credit hours of coursework in a specific plant-breeding specialization, including a minimum of 20 credit hours of training in experimentation, data analysis, and plant breeding. Students will also complete a minimum of 20 credit hours of approved electives or courses determined by the supervisory committee.

If approved by the Board of Governors, UF will implement the program in fall 2021.

## B. System-Level Analysis and Evaluation in accordance with BOG Regulation 8.011

### Strategic Plan Alignment:

The proposed Ph.D. in Plant Breeding aligns with UF's strategic plan. One of UF's strategic plan goals is to increase the number of overall graduates in STEM. The proposed program focuses on biology, genetics, chemistry, statistics, and computer science, which are all STEM areas. Additionally, the program will support UF's goal of increasing the number of patents, licenses, and options by building upon the current strengths, partnerships, and research efforts of UF/IFAS. UF/IFAS plant breeders have released more than 300 new plant varieties over the last 10 years. The proposed program will help UF recruit more highly qualified Ph.D. students, increasing UF's capacity to develop new plant cultivars while simultaneously engaging with partners in Florida's agricultural and natural resource industries.

The proposed Ph.D. in Plant Breeding also aligns with the Board of Governors 2025 Strategic Plan's goals of increasing the degree production in STEM, strengthening the quality and reputation of academic programs in the SUS, and increasing research activity and community engagement. Since the program qualifies as a program of strategic emphasis in STEM, implementation of the program will increase graduate degree production in these areas. UF faculty are already recognized nationally for their efforts and contributions in plant breeding. Adding a formal degree in plant breeding will increase UF's ability to recruit top students, and it will strengthen the quality and reputation of academic programs in the SUS. The institution is also uniquely positioned, both geographically and through the UF/IFAS Research and Education Centers, to collaborate with Florida's agricultural and natural resources industries. Lastly, the proposed program will increase access to research and external funding opportunities aligning with the Board's strategic priorities.

### **Need for Graduates in the Labor Market:**

UF used data from the U.S. Bureau of Labor Statistics (BLS), the Florida Department of Economic Opportunity (DEO), and several independent studies to demonstrate the workforce need for doctoral graduates in plant breeding. They also provided nine letters of support from industry partners expressing support for the program and interest in hiring program graduates. Each of the letters discussed the critical need for experienced plant breeders and how the proposed program will provide the training and experience necessary.

Table 1 provides an overview of national and state job growth for occupations in CIP code 01.1104. At the national level, BLS projects that the national demand for soil and plant scientists will increase by 6.8% over the next ten years. In Florida, DEO projects that the demand for soil and plant scientists will increase by 9.6% over the next eight years. The BLS also projects that the demand for agricultural and food scientists will increase by 6% over the next ten years.<sup>1</sup>

To further document workforce demand, Board Staff conducted a search on Indeed.com. As of April 12, there were 23 job postings in Florida directly related to plant breeding.<sup>2</sup> The postings included public sector, private sector, and higher education jobs, many of which listed a Ph.D. as the preferred or required education level for the position. For example, Driscoll's posted an opening for an applied research scientist that will oversee research projects, analyze data, and provide scientific leadership by relying on experience in cultivar genetics and knowledge of key supply gaps.<sup>3</sup> Additionally, SEEDWAY, part of the GROWMARK agricultural cooperative, posted an opening for a product development technician to plan, coordinate, and implement trials for crops and visit breeder trials to identify future products.<sup>4</sup>

Overall, given that there are only six existing doctoral programs in this area, Board staff have no concerns over the workforce demand for graduates in the program.

### **Student Demand for the Program:**

The proposed Ph.D. will be the first formal graduate program in the SUS in plant breeding. Over the last 30 years, 113 students have earned graduate degrees from the four UF/IFAS departments collaborating to offer the proposed program. In June 2018, UF surveyed the 49 graduate students enrolled in each of the four departments. Forty-eight percent of the respondents expressed interest in a Ph.D. in Plant Breeding, and 45% of the respondents expressed interest in a doctoral-level program within their current major. The proposed program will offer students the opportunity to earn a formal degree in plant breeding.

### **Overall Summary and Board Staff Comments:**

The proposed Ph.D. in Plant Breeding will leverage existing resources and strengths of UF/IFAS to provide instruction in plant breeding. The institution has provided sufficient evidence of workforce need and student demand both nationally and in Florida. Board staff have no concerns and support moving forward for consideration by the Board of Governors.

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<sup>1</sup> U.S. Bureau of Labor Statistics – Agriculture and Food Scientists: <https://www.bls.gov/ooh/life-physical-and-social-science/agricultural-and-food-scientists.htm#ab-1>

<sup>2</sup> Indeed.com, "Plant Breeding": <https://www.indeed.com/jobs?q=plant+breeding&l=Florida&ts=1618227697292&rs=1>

<sup>3</sup> Driscoll's – Applied Research Scientist: <https://www.indeed.com/viewjob?jk=c24ce81d63f6ec1c&tk=1f386k1pru47o801&from=serp&vjs=3>

<sup>4</sup> Seedway – Product Development Technician: <https://www.indeed.com/viewjob?jk=457ab9535c5fbc2e&tk=1f38ab0det4nj800&from=serp&vjs=3>

**Table 1: Labor Market Demand, CIP Code 01.1104**

CIP2020 Code	Occupations	FL Change, 2020-28 Percent	National Change, 2019-29 Percent	FL Total Annual Average Job Openings	National Openings, 2019-29 Annual Average	FL Change, 2020-28 Number	National Change, 2019-29 Number	BLS Typical education needed for entry
01.1104	Agricultural Sciences Teachers, Postsecondary	13.7	2.1	55	900	71	200	Doctoral or professional degree
	Soil and Plant Scientists	9.6	6.8	41	1,900	31	1,200	Bachelor's degree
	Agricultural and Food Scientists - Food Scientists and Technologists	10.1	4.4	31	1,400	24	600	Bachelor's degree

Sources:

Date Retrieved: 3/29/2021

U.S. Bureau of Labor Statistics – <https://www.bls.gov/ooh>

Florida Department of Economic Opportunity - <http://www.floridajobs.org/labor-market-information/data-center/statistical-programs/employment-projections>

**C. Assessment of the University Review Process in accordance with BOG Regulation 8.011:**

*Due to the system of stair-step accountability set in place by the Board of Governors in Regulation 8.011, it is now incumbent upon the University Board of Trustees to verify that all doctoral programs coming before the Board of Governors have met the requirements of the regulation. The following is an assessment of the university review process to ensure that all criteria set forth have been considered by the university prior to submission to the Board of Governors office.*

**ACCOUNTABILITY**

**Check the 'yes' or 'no' box, and make comments beneath the criterion as appropriate.**

**1. Overall** – *The proposal is in the correct format, includes all necessary signatures, and contains complete and accurate tables for enrollment projections, faculty effort, and the proposed budget.*

**YES    NO**

    **The proposal has been approved by the university board of trustees and includes all required signatures.**

The program proposal was approved at the December 4, 2020, Board of Trustees meeting.

    **The university has provided a proposal written in the standard SUS format, which addresses new academic program approval criteria outlined in BOG Regulation 8.011.**

    **The pre-proposal was reviewed by the Council of Academic Vice Presidents (CAVP) workgroup and any concerns identified by the group have been listed and addressed in the proposal.**

The pre-proposal was reviewed by the CAVP Academic Coordination Group on February 22, 2019, and no concerns were expressed.

    **The university has provided data that supports the need for an additional program in the State University System, as well as letters of support or concern from the provosts of other state universities with substantially similar programs.**

    **The university has provided complete and accurate projected enrollment, faculty effort, and budget tables that are in alignment with each other.**

- The university has included a statement in the proposal signed by the equity officer as to how this proposal will meet the goals of the university's equity accountability plan.**

The Equal Opportunity Officer signed the proposal on October 9, 2019.

- The program does not substantially duplicate programs at FAMU or FIU or, if it does, evidence was provided that consultations have occurred with the affected university on the impact of the new program on existing programs.**

The proposed program does not duplicate an existing program at Florida Agricultural and Mechanical University nor Florida International University.

**2. Budget** – *The proposal presents a complete and realistic budget for the program consistent with university and BOG policy, and shows that any redirection of funding will not have an unjustified negative impact on other needed programs.*

**YES NO**

- The University Board of Trustees has approved the most recent budget for this proposal.**

The budget for the proposed program was approved in conjunction with the full proposal by the Board of Trustees on December 4, 2020.

- The university has reviewed the budget for the program to ensure that it is complete and reasonable, and the budget appears in alignment with expenditures by similar programs at other SUS institutions.**

The cost per FTE for the proposed program aligns with the 2019-2020 SUS expenditure analysis for graduate programs in the CIP 01 family.

- The proposal indicates that the program will follow the cost-recovery or market-rate funding models. If so, details and timelines for getting approvals for these funding models are included in the proposal.**

The proposed program will not operate using a cost-recovery or market-rate funding model. It will primarily utilize a combination of E&G and philanthropy/endowment funding for the program.

- In the event that resources within the institution are redirected to support the new program, the university has identified this redirection and determined that it will not have a negative impact on undergraduate education, or the university has provided a reasonable explanation for any impact of this redirection.**

UF anticipates that implementation of the program will yield no negative impact on related programs.

## **READINESS**

**Check the 'yes' or 'no' box, and make comments beneath the criterion as appropriate.**

**3. Program Quality** – *The proposal provides evidence that the university planning activities have been sufficient, and responses to any recommendations to program reviews or accreditation activities in the discipline pertinent to the proposed program have been addressed.*

**YES    NO**

- The university has followed a collaborative planning process for the proposed program in accordance with policies and procedures adopted by the University Board of Trustees.**

UF provided a narrative and chronological table of events that occurred during the development of the proposal and a list of the campus constituents involved. Additionally, UF provided a table of events necessary for the implementation of the proposed program.

- An external consultant has reviewed the proposal and supports the department's capability of successfully implementing this new program.**

Four external consultants reviewed the proposal for the program. Each of the external consultants provided a report, and all had positive feedback and support for the program.

- **Dr. William Tracy**, Professor of Agronomy at the University of Wisconsin-Madison, former Department Chair
- **Dr. Wayne Smith**, Professor of Cotton Breeding and Associate Department Head, Department of Soil and Crop Sciences at Texas A&M University, and Vice-Chair of the Plant Breeding Coordinating Committee Executive Committee
- **Dr. B. Todd Campbell**, Research Geneticist, USDA-ARS, Coastal Plains Soil, Water, and Plant Research Center and former President of the National Association of Plant Breeders
- **Dr. Rex Bernardo**, Professor and Endowed Chair of Corn Breeding at the University of Minnesota, and former Associate Director of Graduate Studies and former Director of Graduate Studies in Applied Plant Sciences at the University of Minnesota

- The university has found the level of progress that the department has made in implementing the recommendations from program reviews or accreditation activities in the discipline pertinent to the proposed program to be satisfactory.**

UF summarized recent program reviews for the academic departments associated with the proposed program and provided an overview of the progress each has made in implementing the recommendations from the reviews.

- The university has analyzed the feasibility of providing all or a portion of the proposed program through distance learning.**

The program will be offered primarily through a traditional delivery format with some

courses offered online. Additionally, some courses will be offered at the UF/IFAS Research Education Centers located throughout the State of Florida.

- If necessary, the university has made allowances for licensure and legislative approval to be obtained in a timely manner.**

No applicable licensure or legislative approval is required for the proposed program.

**4. Curriculum** - *The proposal provides evidence that the university has evaluated the proposed curriculum and found that it describes an appropriate and sequenced course of study and that the university has evaluated the appropriateness of specialized accreditation for the program.*

**YES NO**

- The university has reviewed the curriculum and found that the course of study presented is appropriate to meet specific learning outcomes and industry-driven competencies discussed in the proposal.**

UF provided the curriculum for the proposed program, and the coursework is designed to meet the learning outcomes for the degree. UF consulted with private, non-profit, and academic partners to develop the curriculum for the program. To ensure continued academic and workforce alignment, the program plans to create a program advisory board that will meet every other year to review and update the program's curriculum and strategic plan. The Board will have internal and external academic representatives, and it will also include representation from the private sector.

- The university anticipates seeking accreditation for the proposed doctoral program or provides a reasonable explanation as to why accreditation is not being sought.**

There are no specialized accrediting bodies available for doctoral programs in plant breeding.

**5. Faculty**– *The proposal provides evidence that the university is prepared to ensure a critical mass of faculty will be available to initiate the program based on estimated enrollments and that faculty in the aggregate have the necessary experience and research activity to sustain a doctoral program.*

**YES NO**

- The university has reviewed the evidence provided and found that there is a critical mass of faculty available to initiate the program based on estimated enrollments.**

UF identified 27 existing faculty members who will participate in the proposed program, and all faculty will begin participation in fall 2021. By year 5 of the program, the institution will hire one additional faculty member at the assistant professor level. All faculty will be housed in one of the four academic units associated with the proposed program.

- The university has reviewed the evidence provided and found that the faculty,**

**in aggregate, has the necessary experience and research activity to sustain the program.**

UF reviewed the credentials of all faculty members participating in the program, and their curriculum vitae were included in Appendix C of the proposal.

- The university has reviewed the evidence provided and found the academic unit(s) associated with this new degree to be productive in teaching, research, and service.**

UF provided multiple examples showing that the academic units associated with the proposed degree program have been productive in teaching, research, and service.

- If appropriate, the university has committed to hiring additional faculty in later years, based on estimated enrollments.**

UF will hire one faculty member to participate in the program by year 5.

**6. Resources**– *The proposal provides evidence that the university has ensured the available library volumes and serials; classroom, teaching laboratory, research laboratory, office space, equipment, clinical and internship sites, fellowships, scholarships, and graduate assistantships will be sufficient to initiate the program, and that if applicable, funding has been secured to make more resources available as students proceed through the program.*

**YES NO**

- The university has provided a signed statement from the Library Director verifying that the library volumes and serials available are sufficient to initiate the program.**

The Library Director signed the proposal on November 11, 2019.

- The university has ensured that the physical space necessary for the proposed program, including classrooms, laboratories, and office space, is sufficient to initiate the program.**

UF provided descriptions of the physical spaces available to the program. The proposal indicates that two spaces are needed to sustain the proposed program: an office for the program administrator and common office space for graduate students. In response to the memo with questions, UF identified existing spaces that will meet these needs.

- The university has ensured that necessary equipment is available to initiate the program.**

UF provided multiple examples of equipment available to support the instruction and research of the proposed program.

- The university has ensured that fellowships, scholarships, and graduate assistantships are sufficient to initiate the program.**

UF indicated that students would receive graduate assistantships and fellowships funded through IFAS research efforts and philanthropy endowments totaling \$120,000 in year 1. Additionally, UF plans to increase that amount by year 5 of the program.

- If applicable, the university has ensured that the department has arranged a suitable number of clinical and internship sites.**

The program is a field-based applied breeding program, and students are required to conduct extensive fieldwork research embedded within their coursework. However, a separate internship or practicum experience is not required for this program.