Ph.D. Aerospace Engineering
CIP 14.0201
Florida State University

Board of Governors Staff Analysis
OCTOBER 2024

Table of Contents

PROGRAM DESCRIPTION AND OVERVIEW 1

NEED FOR GRADUATES IN THE LABOR MARKET 2

Doctoral Degrees in Aerospace Engineering By Institution 2

Workforce Demand 3

STUDENT DEMAND AND PROJECTED ENROLLMENT 4

ALIGNMENT WITH INSTITUTIONAL AND SYSTEM STRATEGIC PRIORITIES 5

FACULTY 5

RESOURCES 6

ESTIMATE OF INVESTMENT 6

CONCLUSION AND BOARD STAFF COMMENTS 6

Program Description and Overview

Florida State University (FSU) is proposing a Ph.D. in Aerospace Engineering through its joint College of Engineering with Florida Agricultural and Mechanical University (FAMU). The proposed program is on the new Program of Strategic Emphasis list, which was approved at the November 2023 Board meeting. The program will focus on creating, advancing, testing, and manufacturing aircraft, spacecraft, and associated systems and structures.

Prospective students may be admitted to the program with a master's or bachelor's degree in mechanical or aerospace engineering. Undergraduate students with an excellent academic record and demonstrated potential for advanced research may be admitted through the direct B.S. to Ph.D. program.

Students entering with a master's degree must complete 48 credit hours. Students entering with a bachelor's degree must complete 60 credit hours. All students must pass the preliminary exam and complete original dissertation research, which they must defend before a faculty committee. Areas of emphasis include but are not limited to fluid dynamics, structures, thermal transport, dynamics, and control.

Program graduates will have the knowledge and skills necessary for roles as aerospace engineers and researchers in the military, commercial aviation, defense, and space industries. Graduates will be prepared to work as aerospace engineers, engineering managers, and faculty in engineering-related fields.

Florida State University's Board of Trustees approved the proposed program on June 20, 2024. If approved by the Board of Governors, the proposed Ph.D. in Aerospace Engineering will be the third Ph.D. program in the System in CIP 14.0201. Table 1 provides a summary overview of the Ph.D. in Aerospace Engineering.

Table 1: Proposed Program Summary

Ph.D. in Aerospace Engineering	
Tuition per Credit Hour	$479.32 Florida Resident $1,110.72 Non-Resident
Delivery Mode	Traditional
Location	Main Campus
Graduation Requirements	48 – 60 Graduate Credit Hours (entering with or without a master's affects credit hours)
Effective Date	Fall 2025

Source: Florida State University Ph.D. in Aerospace Engineering Proposal

Need for Graduates in the Labor Market

Programs of Strategic Emphasis are one of several tools for aligning the degree production goals of the State University System with the economic and workforce needs of Florida. During 2023, the Board of Governors did a comprehensive review and revision of the Programs of Strategic Emphasis. The Board approved a new list in November 2023 focusing on Florida's most critical workforce shortages. To be included on the new list, academic programs had to meet certain labor market demand thresholds for projected growth and unfilled job openings. The minimum calculated gap threshold for a doctoral degree is 25 job openings. The minimum calculated growth rate threshold for a doctoral degree is 8.6 percent. The proposed program meets the specified thresholds and is included on the new Programs of Strategic Emphasis list.

The proposed program is focused on advancing and incorporating technologies in aircraft and spacecraft for transportation, communication, exploration, and defense. The program will prepare students to apply knowledge in areas including materials, thermal management, fluid dynamics, acoustics, controls, and solid mechanics. Graduates of the program will be prepared to effectively transfer their knowledge to innovate future aerospace technologies in Florida and globally.

The FAMU-FSU College of Engineering worked with its Mechanical Engineering Department's advisory council, which includes private industry aerospace engineers and Air Force Research Laboratory research scientists. The advisory council provided input for the proposed program and was actively involved in providing feedback on the curriculum and aligning it with industry-driven competencies.

Doctoral Degrees in Aerospace Engineering Awarded By Institution

Florida State University's joint program with FAMU would be the third program in the System under CIP 14.0102. The University of Central Florida (UCF) and the University of Florida (UF) offer a Ph.D. program in this CIP. Dr. William Oates, Chair of Mechanical Engineering at FAMU-FSU College of Engineering, contacted the mechanical and aerospace engineering program chairs at UCF and UF regarding the proposed program. Both chairs offered support for the program. As shown in Table 2, 14 doctoral degrees were awarded in the 2022-23 Academic Year across the System.

Table 2: Degrees Awarded, Ph.D. in Aerospace Engineering, CIP 14.0201

Institution	2017–18	2018–19	2019–20	2020–21	2021–22	2022-23
UCF			2	5	9	7
UF	5	9	6	7	10	7
Total	**5**	**9**	**8**	**12**	**19**	**14**

Source: Board Office of Data Analytics, Degrees Awarded by CIP, retrieved 8/26/2024.

Workforce Demand

The proposed Ph.D. program in Aerospace Engineering will strategically position graduates for employment opportunities projected to grow significantly in Florida and nationwide, including roles as aerospace engineers, engineering managers, and faculty and researchers.

While the minimum education required for aerospace engineers is a bachelor's degree, graduates will meet the demand for advanced research positions. As shown in Table 3, the number of jobs for aerospace engineers in Florida is projected to increase by more than 18 percent over the next eight years, with an average of 499 job openings each year. The current median salary for aerospace engineers in Florida is $105,643.

Engineering manager positions are projected to see substantial growth. Though the minimum education required for the occupation is a bachelor's degree, graduates will meet the demand for advanced leadership positions. As shown in Table 3, the demand for engineering managers is projected to grow ten percent in Florida over the next eight years. This growth amounts to an average of 703 job openings each year. The current median salary for engineering managers in Florida is $147,950.

The demand for engineering faculty also continues to increase. As shown in Table 3, the demand for engineering faculty is projected to grow more than 15 percent in Florida over the next eight years, amounting to an average of 89 job openings each year. The current median salary for postsecondary faculty in Florida is $73,332.

Board staff conducted an independent search on Indeed.com and LinkedIn for job openings in aerospace engineering requiring a Ph.D., using keywords such as aerospace, aerodynamics, engineer, and propulsion. The search identified over 44 current Florida job openings within the public and private sectors. The job titles include chief space systems engineer, senior mission management engineer, aerospace engineering faculty, and quality control manager. Common employers include Northrop Grumman, Blue Origin, L3Harris Technologies, and the University of Florida.

Based on projected program enrollments and the labor market demands in both Florida and nationwide, program graduates would not be expected to saturate the market.

Table 3: Labor Market Demand, CIP Code 14.0201

Occupations	Percent Change in Job Openings		Annual Average Job Openings		Total # of New Jobs		Education Level Needed for Entry
	FL 2023-31	U.S. 2022-32	FL 2023-31	U.S. 2023-32	FL 2023-31	U.S. 2022-32	
17-2011 Aerospace Engineers	18.4%	6.10%	499	3,800	1,085	3,900	Bachelor's Degree
11-9041 Architectural and Engineering Managers	10.0%	4.10%	703	13,600	812	8,200	Bachelor's Degree
25-1032 Engineering Teachers, Postsecondary	15.8%	9.30%	89	4,100	128	4,200	Doctoral or Professional Degree

Sources: U.S. Bureau of Labor Statistics, https://data.bls.gov/projections/occupationProj; Florida Department of Commerce, http://www.floridajobs.org/labor-market-information/data-center/statistical- programs/employment-projection
Date Retrieved: 8/12/2024.

Student Demand and Projected Enrollment

Florida State University projects student interest in the proposed program based on a survey conducted by the FAMU-FSU College of Engineering. The survey of current students focused on their interest in pursuing graduate study in aerospace engineering at the college. Of 285 survey responses, 150 students expressed strong interest, while 79 indicated moderate interest in the program.

The anticipated total enrollment for students in the proposed FAMU-FSU program is 6 Ph.D. students in Year 1, with a projected enrollment of 24 Ph.D. students in Year 5, as shown in Table 4.

Table 4: Projected Total FAMU and FSU Student Enrollment

	Student Headcount	Student FTE
Year 1	6	6
Year 2	9	9
Year 3	14	10
Year 4	20	16
Year 5	24	18

Source: Florida State University Ph.D. in Aerospace Engineering Proposal

Alignment with Institutional and System Strategic Priorities

The proposed program aligns with Florida State University's mission of preserving, expanding, and disseminating knowledge that supports creative research endeavors and service. The proposed program will support the expansion of aerodynamics research in the Florida panhandle through the new Triumph Gulf Coast project, which is the building of advanced manufacturing and aerospace facilities in Bay County. Additionally, opportunities in defense-related projects and technology exist in Florida with the presence of key military bases such as Eglin, Tyndall, and MacDill Air Force Research Laboratories.

The proposed Ph.D. program in Aerospace Engineering supports the 2025 System Strategic Plan's goals in teaching and learning, scholarship, and research and innovation. The program aligns with the System's goals to increase STEM degrees and Programs of Strategic Emphasis. The program will promote excellence through an interdisciplinary approach integrating advanced physics, materials science, mathematics, technology, and professional development. The program's focus on providing high-quality graduate education and training in aerospace engineering will directly increase the scientific knowledge of its graduates and will prepare graduates to meet Florida's workforce needs.

Faculty

The FAMU-FSU College of Engineering will use a mix of existing faculty and new faculty to support this program. The proposal identified 19 existing faculty members who will contribute to the proposed program in the next five years. The College of Engineering also plans to hire 11 additional program faculty members over the next five years. The proposal included multiple examples showing that the faculty associated with the proposed program has the necessary experience and research to sustain the program.

Resources

Florida State University provided evidence in the proposal that sufficient resources are available to initiate the program. The university documented that sufficient library and physical resources would be available to sustain the program through Year 5. The university also included examples of available equipment to support and sustain the program's instruction and research.

The FAMU-FSU College of Engineering plans to attract and support highly qualified graduate students in the proposed program by providing $50,000 in fellowships initially in Year 1 and through Year 5.

Estimate of Investment

The proposed program will be funded through contracts and grants and Education and General (E&G) funds reallocated from the existing mechanical engineering budget. The total reallocated in Year 1 is $307,825, and the impact on the Mechanical Engineering Department is anticipated to be negligible. As shown in Table 5, FAMU-FSU College of Engineering intends to expend $764,696 in Year 1 and $1,862,223 in Year 5.

The program will charge students the standard approved graduate tuition rates, which are currently $479.32 per credit hour for resident students and $1,110.72 for non-resident students.

Table 5: Projected Program Costs

Total Costs		Source	Cost per FTE
		E&G and C&G	
Year 1	$764,696	$307,825/$456,871	$17,101
Year 5	$1,862,223	$703,375/$1,158,849	$11,531

Source: Florida State University Ph.D. Aerospace Engineering Proposal

Conclusion and Board Staff Comments

If approved, the FAMU-FSU Ph.D. in Aerospace Engineering will be the third program in the System. The institution provided sufficient evidence to demonstrate the workforce needs for individuals trained at the doctoral level and to support headcount projections. The proposed Ph.D. program will support the Board of Governors 2025 Strategic Plan by producing more graduates in Programs of Strategic Emphasis while increasing the supply of aerospace engineers, engineering managers, and engineering faculty. Board staff has no concerns regarding the proposed program.

STATE UNIVERSITY SYSTEM OF FLORIDA

Board of Governors
State University System of Florida
325 West Gaines Street, Suite 1614
Tallahassee, Florida 32399
Phone: (850) 245-0466
www.flbog.edu