

**Bachelor of Science and Master of Science Cybersecurity
Board of Trustees Academic and Student Affairs Committee
December 4-5, 2019**

Executive Summary

The Department of Computer and Information Sciences (CIS) at Florida A&M University proposes to offer the Bachelor and Master of Science degrees in Cybersecurity (CyS). The goal of the B.S. program in Cybersecurity is to prepare students to meet the cybersecurity needs of business, government, healthcare, education, and society. Program graduates will possess the skills and knowledge to assume appropriate entry-level professional positions, and to grow into leadership positions or pursue research or graduate studies in the field. The baccalaureate program is designed to satisfy ABET program accreditation criteria for Cybersecurity and is based on the ACM Cybersecurity Curricula. It will provide breadth through fundamental courses in the science of cybersecurity, the practice of cybersecurity, and the social impacts of cybersecurity. Throughout the curriculum, enrolled students may achieve depth through courses in areas such as: digital forensics; cyber law and ethical hacking; cybersecurity risk management and audit; and cryptography. Graduates of this program will be equipped to enter career paths such as: Security Analyst, Security Engineer, Security Architect; Security Administrator, etc. The program requires the completion of 120 credit hours.

The proposed Master's in Cybersecurity supports the Board of Governors' vision for Florida to be a national leader in cybersecurity education and research. This program provides the focused graduate education necessary to meet our state and national security challenges and create economic opportunities for students within and outside of Florida, particularly minority students, consistent with FAMU's historic mission. Specifically, the proposed degree will position FAMU to increase the production of graduates who are prepared "to apply their knowledge, critical thinking skills and creativity" to the meet the growing need to secure our ation's information systems. It will also aid the Board of Governors in meeting its strategic goals to (1) Increase degree productivity, particularly in Programs of Strategic Emphasis, and (2) Increase research activity and attract more external funding. The program is also consistent with FAMU's mission "dedicated to the advancement of knowledge, resolution of complex issues and the empowerment of citizens and communities". Both programs directly support the SUS Strategic Planning Goal, *Increase the Number of Degrees Awarded in STEM and Other Areas of Strategic Emphasis*.

The mission of the institution, as it relates to research, is to develop and institutionalize a set of cutting-edge research priorities for the University. The graduate degree in cybersecurity will be interdisciplinary aimed at achieving the following goals: (1) Promoting STEM research in HBCUs, thus increasing the levels of state and federal funding; (2) exploiting opportunities for cross-disciplinary research integrating STEM disciplines, cybersecurity, and technologies such as machine learning, AI and data science, in order to solve real-world problems; (3) Increasing the number of graduate students conducting research and growing the number of African-American graduates entering the workforce with these skill sets.

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Both the bachelor’s and master’s programs will be delivered face-to-face and online. Consideration was given to offering the two new programs as majors within the existing BS Computer Science and MS Computer Science. However, based on student and industry demand for professionals with keen knowledge of cybersecurity, program faculty and administrators determined that a stand-alone degree would add greater value to meeting workforce demand.

Strategic Relevance of Proposed Program

Table A. Strategic Relevance of Proposed Program

Department Mission	To provide fundamental knowledge and relevant experience to support careers involving the application, advancement and creation of computer and information technology to serve industry, government, and society.	
Relevant CST Strategic Initiatives	Initiative 1:	Provide high quality academic experiences through excellence in teaching and assessment of student learning.
	Goal 1:	Enhance the quality of educational experience of students in all degree programs.
	Strategies	6: Develop new graduate and undergraduate degree programs. 9: Increase distance learning course offerings.
Relevant FAMU Strategic Priorities	Priority 1:	Exceptional Student Experience
	Goal 1.	Goal 1: Enhance pathways to degree attainment.
	Goal 4.	Increase the number of students graduating from programs in areas of high employer demand.
SUS Goals	Teaching & Learning	Increase the Number of Degrees Awarded in STEM and Other Areas of Strategic Emphasis. Increase Degree Productivity and Program Efficiency. Strengthen Quality & Reputation of Academic Programs and Universities.
SUS Performance Funding Metrics Impacted	Metric 1:	Percent of bachelor’s graduates enrolled or employed (\$25,000+) in the U.S. one year after graduation.
	Metric 2:	Median wages of bachelor’s graduates employed full-time one year after graduation
	Metric 8:	Graduate degrees awarded within programs of strategic emphasis.

Workforce Demand for Cybersecurity Professionals

In today’s job markets, cybersecurity jobs are skyrocketing and the chronic national shortage of minority professionals in computing remains. Cybersecurity presents an economic

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opportunity for female and minority students; however, the minimum requirements for many jobs require professional or advanced experience. The mission of Florida A&M University in meeting the educational needs of African Americans and other minorities, combined with over 130 years of experience in nurturing minorities, gives the University a unique opportunity to address and successfully ameliorate this national problem. The introduction of the cybersecurity program at FAMU, will position the State of Florida to show significant gains in the production of minority cybersecurity professionals.

FAMU's MS Cybersecurity will prepare and encourage more minority students to earn graduate degrees and enter these job markets. National trends show a dramatic rise in cybersecurity degree programs, motivated by a critical workforce shortage, exacerbated by an increasing frequency and sophistication of attacks on society and institutions. The 2018 Cybersecurity Workforce Study (<https://www.isc2.org/Research/Workforce-Study>), reports a global shortage of 2.93 million cybersecurity professionals and, because of existing cyber workforce shortage, over 60% of the companies polled felt a heightened risk of cyberattack. Respondents felt the need for improved skills for entry-level cybersecurity professionals, coupled with employer commitments to continued professional development for cybersecurity personnel. The study found that cybersecurity professionals make about \$85K per year, on average; those with security certifications have an average salary of \$88K, while those without earn much less—about \$67K, on average. The US Bureau of Labor Statistics projected median pay of \$95,500 per year, with an annual growth rate of 28% during the period 2016-26.

To address the need for cybersecurity professionals within the state, the Florida Center for Cybersecurity (FC²) was launched with the goal of making Florida the national leader in cybersecurity education. To date, FC², renamed CyberFlorida, has stimulated collaboration amongst the 12 SUS institutions resulting in cross-institutional research and sharing of educational resources. The proposed program has been influenced by these collaborations and work on the SUS Advisory Council to CyberFlorida. FAMU anticipates contributing to this body of work with the approval of the proposed degrees.

Student Demand

Demand for cybersecurity courses at FAMU has grown. In the last two academic years, over 270 students enrolled in the cybersecurity courses either as part of a requirement to complete a certificate in cybersecurity or as electives for other majors within the department. Despite a decades-long national goal of achieving a fully inclusive workforce, minorities, in particular African Americans, remain highly underrepresented in the fields of science and engineering and especially underrepresented in computer science and cybersecurity. The introduction of the undergraduate and graduate programs in Cybersecurity at FAMU will help to address this need.

Nationwide, universities are expanding program offerings in cybersecurity. The prospects of FAMU acquiring funding from NSF, DHS, and NSA are high, and these funds can assist in attracting an increasing number of minority and female graduate students to study cybersecurity at FAMU. Cybersecurity provides a unique STEM experience that prepares graduate students for job opportunities in government, academic, and private sector.

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According to ZipRecruiter.com, job postings for Cybersecurity Specialists increased over 400% in both healthcare and finance and 280% in government within a one-year period ending March 2018. Given the steadily increasing demand for people with cybersecurity knowledge, skills, and abilities, a degree in cybersecurity will position our students to help meet the demand. Cybersecurity is emerging as an essential component of many academic disciplines. Having cybersecurity programs at FAMU increases the university's capacity to meet this critical need.

Initial Enrollment Projections

	<i>Bachelors</i>	<i>Masters</i>
<i>Year One</i>	12	3
<i>Year Two</i>	24	14
<i>Year Three</i>	32	17
<i>Year Four</i>	42	21
<i>Year Five</i>	46	25

Current Successes

FAMU carries the designation of National Center of Academic Excellence in Cyber Defense Education. The designation recognizes the strength of the cyber security certificate curriculum, which was shown to map to the NICE framework. The FAMU Center for Cybersecurity was established in 2008 (as FAMU Center for Secure Computing and Information Assurance (FCSCIA)) for the promotion of cybersecurity education, research and outreach. Since its inception in 2004, the cybersecurity certificate program has expanded to a cybersecurity minor for non-CIS majors, and cybersecurity certificates for CIS majors (CS, IT and IS). The CIS Department has amassed a solid record of research by undergraduate and graduate students. CIS faculty have successfully collaborated on CyberFlorida seed-funding grants with FSU, UWF and UNF.

Recognizing that as technology advances and the world becomes increasingly information-driven, the demand for cybersecurity professionals continues to increase and the tasks of cybersecurity become progressively more challenging. In response to this national need, the University established the Florida A&M University Center for Cybersecurity (FCCS), which is housed in the Department of Computer and Information Sciences (CIS). FCCS promotes, coordinates, and implements education, research and innovation in cybersecurity. The core objectives and purpose of FCCS include:

- Ensure that the cybersecurity curriculum aligns with standards defined by the NSA/DHS National Centers of Academic Excellence in Cyber Defense (CAE-CD) program
- Increase minority participation in cybersecurity related careers.
- Support university initiatives and projects in cybersecurity.
- Maintain a program of research in cybersecurity.
- Serve as a community, regional and national resource for educational institutions, small businesses, and the general population.

Resources

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The cost for this program will be relatively low as much of the costs associated with the program will come from existing resources already dedicated to the College of Science and Technology and the Computer Science Department. Because cybersecurity is complimentary to the department's existing programs in Computer Science, Computer Information Systems, and Information Technology, faculty and staff will be utilized to teach and support the two new programs. Additionally, the Provost has already dedicated monies for new faculty hires in AY2019-20 which are sufficient for initial enrollment growth. Negative impact to existing programs will be minimal with the addition of the new faculty. Existing programs also have strong enrollment and degree output and will continue as student demand is warranted.

Additional resources anticipated by year five are as follows:

- Computer Programmer I
- Additional adjunct instructors
- One graduate assistantship
- Physical space to support enrollment growth