FIVE YEAR PROGRAM REVIEW
CYBER SECURITY

Phillips Community College of the University of Arkansas

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PROGRAM REVIEW

Cyber Security	0125	11.1003	15 Credit hours	CP

BRIEF PROGRAM SUMMARY

Enrollment Based on Productivity Outcomes/ Annual Completions: The cyber security program has **4.25 FTEs** based on a four-year average. There were **17 completers during the last four years**. The program was approved by ADHE April 21, 2017. There were no graduates in 2017-18 because the program design was to get the cyber security certificate toward the end of the two-year AAS.

Program Cost: PCCUA has incurred no costs for this program. Three grants have covered costs for materials, supplies, and instruction. These are the Arkansas Louis Stokes Alliance for Minority Participation (ARK-LSAMPS), the National Science Foundation, and Carl Perkins funding. The program costs are mainly for faculty additional compensation. The total cost of the program for all five years is $33,412.50 and this includes faculty salaries and benefits.

Income from Tuition and Fees for Fall 2017-Fall 22-It is difficult to count the actual income for the Cyber Security program. Most students taking the courses are also taking other courses and are full time enrolled. Additionally, all five classes are not offered in one term. For the purpose of this report, course slots are calculated and the rate per course is provided. Although we know this varies from course to course, this does give us a general idea of credits generated and income. Actually, many students enrolled full time take the cyber security courses as extra certification courses. The estimated income for the program is calculated by taking the course costs $ 319 ($225 tuition + $94 fees) and multiplying it by the average class size of 7 times 19 courses offered over the four-year period. **The formula is 7 students x 19 course offerings =119 x $319 tuition and fees=$37,961 program income.**

Future Plans: PCCUA would like to add a foundation level for Cyber Security which would allow students to acquire the certificate more quickly and much earlier in their program. It would also increase enrollment. Projections for student growth are provided in Table A.

Table A: Future Enrollment Projections

Year	2022-23 (29 existing students)			2023-24 (34 projected enrollment)			2024-25 (38 projected enrollment)		
Ethnicity	White	Black	Other	White	Black	Other	White	Black	Other
Projected Enrollment	14/48%	12/42%	3/10%	15/44%	15/44%	4/12%	17/45%	17/45%	4/10%
Note: Program projections reflect an increase in minority participation in the field.									

Phillips Community College has always been a leader and innovator in higher education in Arkansas. The College has academic, occupational/technical, and continuing education programs. New programs are continually being researched and planned so that PCCUA will remain responsive to the needs and interests of the people of Eastern Arkansas. Phillips Community College consists of three campuses located in Helena-West Helena, DeWitt, and Stuttgart, Arkansas. The main campus is located in Helena-West Helena, Arkansas, and the school serves the needs of Eastern Arkansas. According to the mission statement:

> *Phillips Community College is a multi-campus, two-year college serving the communities of Eastern Arkansas. The college is committed to helping every student succeed. We provide high-quality, accessible educational opportunities and skills development to promote life-long learning, and we engage in the lives of our students and our communities.*

HISTORY OF THE PROGRAM

Enrollment Based on Productivity Outcomes/ Annual Completions: The Cyber Security program has **4.25 FTEs** based on a four-year average. PCCUA had **17 completers during the last four years**. The program was approved by ADHE April 21, 2017 but there were no graduates in 2017-18 because the program relied on students getting the certificate at the end of their two-year AAS degree. Based on the four-year outcome, cyber security does meet ADHE's productivity program requirements. Unfortunately, ADHE productivity is based on three years and because of the low 2020 outcome the ADHE count shows 3.33 FTEs. Many community colleges had this problem in the Spring of 2020 because of the shut down as a result of the Covid pandemic. However, we have explained the situation in the ADHE comments file and we want to keep this program, we know we can increase the number of students.

Program Costs 2016-2021-Fortunately, PCCUA has incurred no costs for this program. Two grants cover the faculty costs which are mainly additional compensation courses. The first source of faculty compensation is tied to a subgrant from the University of Arkansas at Pine Bluff called the Arkansas Louis Stokes Alliance for Minority Participation (ARK-LSAMPS). The College was awarded a three-year National Science Foundation, Advanced Technology Education grant in 2019. Because of the COVID-19 pandemic, the college received a no cost extension; therefore, the grant is in the fourth and final year. This grant allowed us to work on reviewing the existing Information Systems Program including certificates of proficiency to develop alternative delivery options, increase student enrollment and retention, and provide some professional development for faculty. Great work has been completed and project activities are being implemented with positive results for project goals. More importantly, enrollment is up. However, during the first Covid shut-down, we lost the few students we had enrolled. As faculty have researched and collaborated using feedback from the Advisory Council, they realize that the cybersecurity program needs additional evaluation and research to expand and provide a quality educational program to prepare students for a career in cybersecurity along

with industry certifications. Cybersecurity is an ever changing, high demand field with a critical labor shortage and need for a skilled workforce. The Cybersecurity program is needed for students seeking to learn the curriculum and enter the workforce as well as those in the community including business and industry that are already working and want to upgrade or advance their cybersecurity understanding and skill set.

The Total Costs of the Program Is Entirely Funded by Grants: The Program costs include $24,750 for faculty salaries + $8,662.50 for benefits (35%) = $33,412.50.

Income from Tuition and Fees for 2017-21 If it had not been for the College closure in the Spring of 2020, it is likely there would have been three or four graduates that term. It is difficult to estimate costs because most full time Computer Information Systems students take two cyber security classes toward the end of the degree pathway. The classes average about 7-8 students per course. Calculating the $319 for tuition and fees ($225 tuition + $94 fees) and multiplying the average class size of 7 students x 17 classes offered=119. Multiply the 119 by $319 cost of tuition and fees and the income is $37,961. That would be exact if all students were part time. Actually, most students are full time and the course tuition and fees are tied to the full-time enrollment cost of $1,125 tuition + $430 fees. The total cost for a full-time student is $1,555. If you divide that by 5 classes or 15 credits, the cost is $311 per class which is slightly less than the part-time student fee. Most students at PCCUA do receive Pell Grant support and most are full time. See Table B.

Table B: Course Offerings and Costs Per Term

Course	Cost for Courses 2017-18	Cost for Courses 2018-19	Cost for Courses 2019-20	Cost for Courses 2020-21	Cost for Courses 2021-22	Cost for Courses 2022-23
CYS 103 Scripting Fundamentals	$1,650	$00.00	$00.00	$1,650	$1,650	$00.00
CYS 113 Advanced Linux Operating Systems	$00.00	$1,650	$1,650	$1,650	$00.00	$1,650
CYS 123 Intrusion Detection/Prevention	$1,650	$00.00	$1,650	$1,650	$00.00	$1,650
CYS 133 Network Security Fundamentals	$00.00	$1,650	$00.00	$1,650	$1,650	$00.00
CYS 143 Ethical Hacking/Network Defense	$1,650	$00.00	$00.00	$1,650	$1,650	$00.00
Total	$3,300	$3,300	$3,300	$6,600	$4,950	$3,300

Note: The multiple course offerings in 2020-21 were a result of the spring 2020 closure. We lost students that term and wanted to make sure those students could complete in the 2020-21 academic year.

STATEMENT OF NEED

Our College is biracial and has one of the highest percentages of underserved minority citizens in Arkansas. All programs are designed to help our students succeed in college and in life. In our efforts we serve communities with extraordinarily high poverty, a high minority population, critically low educational attainment rates, and because the area has distressingly high teen pregnancy rates, many of our students are single mothers. We serve students who face so many obstacles in life and are some of the neediest in the region, state, or the nation. We hope that we can retain many of the students we graduate in the communities we serve. We know that the development of the cybersecurity program will allow us to expand that career pathway while ensuring that our graduates have an opportunity to work in cybersecurity in this region.

There are only five high level courses for the PCCUA Cybersecurity CP and we realize that students need much more extensive exposure to this major. The College plan is to increase cybersecurity course offering to expand the cybersecurity pathways. It will also serve as an economic development resource engine. Recently, the College partnered with Phillips Fibers, a regional consortium dedicated to improving broadband access. Our region of rural Eastern Arkansas has suffered ransomware and other kinds of cyber-attacks. The pandemic has created problems for all PCCUA communities and has heightened our awareness of the need to address broadband issues. All this makes the need for greater cyber training critical to educational and economic development. Only 66% of Arkansas has access to high speed internet (100 Mbps + coverage) and this places the State at 50th and makes it the lowest ranking state with access to high speed. Arkansas also has less Digital Subscriber Line service than most states which compounds the digital issues. Arkansas' most available internet service is through cable, delivered through the cable wiring used for television. Because fiber optics are new and costly, Arkansas has not made great strides in fiber optic internet service. PCCUA has partnered with Phillips Fiber, a coalition designed to improve broadband in the region and supported by the State. The College is using recently awarded Title III funds to provide fiber optics on all three campuses. With the assistance of the Title III grant, the College is installing new single-mode fiber throughout all of the buildings on the Helena campus. The new single-mode fiber will increase our internal bandwidth from 1G to 25G. The Title III funds have helped us replace all network switches on all three campuses. The network switches go hand in hand with the fiber to get PCCUA's network to a full 25G. This is a much-needed improvement to our infrastructure and supports the growing and heavy technology use on campus.

PCCUA recognizes the growing demand in the information technology industry and the need to provide quality programs and a curriculum which provides students with a broad range of technology skills to prepare them for high demand, high tech job positions in the information technology industry. Currently, PCCUA offers one Associate of Applied Science degree in Information Systems Technology and four Certificates of Proficiency in the areas of: (1) Maintaining and Managing Personal Computers, (2) Microsoft Operating Systems Desktop Support, (3) Programming/Coding, and (4) Cybersecurity. Students can obtain specialized certificates or use these certificates as a pathway to obtain a two-year degree.

As noted in the Table C, Information Systems Technology is a viable program that produces graduates in the AAS degree and the certificates of proficiency in cyber security is part of that pathway.

Table C: AAS and CP Program Pathways

PROGRAM	2018-19	2019-20	2020-21	2021-22	Total
AAS-Information Systems	2	1	6	13	22
CP-Cyber Security	7	0	6	4	17
CP-Maintaining/Managing PCs	15	12	6	4	37
CP-MS Op. Sys Desktop Support	0	4	8	5	17
CP-Programming/Coding	5	1	5	8	19
TOTAL	29	18	31	34	112

Over the last couple of years, the Division of Business and Information Systems faculty dedicated a significant amount of time evaluating the overall program to ensure the curriculum and program outcomes align with the industry demands and certifications for the workforce. As technology trends have emerged, faculty continually seek ways to implement the most current technology into the curriculum. Faculty attend professional development trainings, workshops, and conferences to keep abreast of new technology (equipment, devices, and software) as well as teaching strategies to provide students with "hands-on" opportunities to learn the most up-to-date technology available in the industry. Recently, PCCUA has been approved as a Testing Center for PSI & CompTIA. Which means students and members of the community acquiring certifications test in our lab. PCCUA has the infrastructure needed to support the cyber security program.

LEADERSHIP AND INSTRUCTION

PCCUA has the capacity to increase the numbers of students enrolled in the cyber security program. The leadership team who manage the program are Monica Quattlebaum, Dean of Business and Information Systems, Cindy Grove, Lead Cybersecurity Faculty, and Charlotte Purdy, Cybersecurity Faculty. Grove and Purdy are currently teaching in the cybersecurity and information systems technology programs. Grove and Quattlebaum are Principal Investigator and Co-Principal Investigator for a National Science Foundation Advanced Technology Education (NSF ATE) grant that is ending this year. All three members of the leadership team have been very involved in the work of the NSF grant therefore and are prepared to continue with more detailed activities related to cybersecurity.

Cincy Grove has worked in the information systems technology industry at PCCUA for almost 25 years and is currently the lead faculty member for Information Systems Technology. Grove has a Bachelor's degree in Computer Information Systems and a Master's degree in Vocational Education with extensive credentials for industry certifications. She is certified in over 14 different information systems areas such as Security+, Ethical Hacker, Access Data Computer

Forensics Examiner, Certified Information Systems Security Professional (CISSP), Advanced Security Practitioner (CASP), Cloud+, and multiple Linux+ certifications. As part of professional development, Grove has attended and participated in various conferences and trainings that include 3CS (Community College Cyber Summit), High Impact Technology Exchange Conference (HI-TEC), Cybersecurity Analyst training for CYSA+ certification, and WiCyS (Women in Cybersecurity). Through the years, Grove has also collaborated with different partnerships as projects and activities were offered. She was actively involved with the University of Arkansas OPENGATE Project which was part of the Advanced Spatial Technologies (CAST) at the University of Arkansas and the Cybersecurity Education Consortium (CSEC) which is a train-the-trainer partnership with a rigorous cybersecurity curriculum that was integrated into course curriculum taught at PCCUA.

Monica Quattlebaum is Dean of Business and Information Systems with a Master's degree in Vocational Education. She served as a lead faculty member for the division before moving into her current position. Quattlebaum serves as the administrator for the NSF ATE grant and is responsible for gathering of data, organizing the project activities, and all internal and external reporting. She is also the administrator for the Regional Workforce grant through the Arkansas Department of Higher Education. The background for the grant was information systems technology but focused on drones, cyber security, and 3D printing. Quattlebaum has collaborated with various groups and other colleges to build partnerships that ensure program development and growth.

Charlotte Purdy is a faculty member in the Division of Business and Information Systems, has a Bachelor's degree in Computer Technology and will graduate in January 2023 with a Master's in Information Systems Technology. Purdy has mentored with Grove for over three years and is now a full-time faculty member. She has participated in extensive training workshops and conferences with organizations such as Western Academy Support & Training Center (WASTC), High Impact Technology Exchange (HI-TEC), CompTIA Partner Summit, Community College Cyber Summit (3CS), and Women in Cybersecurity (WiCyS). She has worked closely with project team for the NSF ATE grant and participated in one of the activities for the Team-Teaching Model. Purdy is very team oriented and collaborates with others at the college and in the community.

All three team members demonstrate longevity with a combined 55+ years of college service and a commitment to continue the work of growing the Information Systems – cybersecurity program at PCCUA.

IMPROVEMENT STRATEGIES AND SCOPE OF WORK FOR THE FUTURE
In a constantly changing and expanding digital world, protecting online data is becoming more critical and necessary which creates more and more jobs in the cybersecurity industry. Cybersecurity is no longer tied to the Information Technology industry exclusively. Almost every industry is affected by cybersecurity therefore these industries are recognizing the growing need to protect every facet of their framework: computer network, database systems, employee data, and customer/client information. Cybersecurity has been a part of the computer and

information technology industry but is quickly rising above other IT areas because cybersecurity is deeply integrated throughout all areas and components of Information Systems Technology. This industry has experienced a growing trend in high demand career positions which has created a critical labor shortage. As the national threat for cybersecurity attacks increase, the demand for a highly trained workforce is growing faster than the job market can sustain. Community Colleges are the pathway for students to receive training along with the necessary industry credentials to meet the industry demand and fulfill the cybersecurity labor shortage.

As the growing demand for a skilled and trained workforce in the cybersecurity information technology industry continues to increase, this program will target two major areas of focus: (1) a growing need for technicians in a highly skilled cybersecurity workforce and (2) provide faculty with professional development and training for credentials to teach in the high-tech information systems programs.   This program has opportunities for growth and expansion of the existing cybersecurity program as well as create additional pathways for students to receive high-tech skills and training needed to enter the high demand job market for the information technology workforce.

The strategies we will use to accomplish this program improvement include:

- Revise the existing cybersecurity curriculum to implement virtualization and "hands-on" simulation curriculum to provide training and skill sets needed for a career in the high demand field of cybersecurity.
- Improve remote learning experiences for all students and provide alternative delivery options for course curriculum with student engagement and practical applications to enhance learning environment.
- Expand the existing Certificate of Proficiency Cybersecurity program to provide additional pathways for students to receive a Technical Certificate in Cybersecurity.
- Develop and implement new cybersecurity courses that focus on preparing students for industry certifications such as SC-900 (Microsoft Security, Compliance, and Identity Fundamentals) and CompTIA Security+, CYSA+ (Cybersecurity Analyst), and CASP+ (CompTIA Advanced Security Practitioner). These courses will include curriculum that ensures students receive the advanced skill sets, knowledge background, and will serve as stepping stones for each certification.
- Increase the cybersecurity program enrollment by 10% each year, with a total target of 30% growth from 2022-2025. Target enrollment will be minority and underrepresented particularly women in cybersecurity along with non-traditional student populations.
- Develop strong cybersecurity industry partnerships to create experiential opportunities for students and graduates while promoting a community awareness for cybersecurity and potential student enrollment.
- Provide faculty professional development opportunities to train in high-tech curriculum to implement and promote course development and receive industry certifications that increase credential levels.

As part of the activities and scope of work, this program focuses on strategies to increase student retention by reducing barriers that students face and keep them from completion and success. Implementing instructor led tutoring sessions along with computer lab sessions will help increase student retention and completion of the program. Establishing student organizations such as Women in Cybersecurity (WiCyS) is another activity that faculty plan to implement. This program will engage students while developing relationships with other student, faculty, and industry partners, and will increase service-learning activities to promote classroom knowledge and integrate it with the cybersecurity industry.

PCCUA has also partnered with Phillips Fiber, a regional effort to improve broadband access in the Delta. This partnership will help rural areas of the delta that currently have very little broadband access to connect to the digital world but at the same time will also increase the opportunity for cyber-attacks and the need for a greater understanding of cybersecurity. Community awareness is another critical component of this program. Offering community workshops and college trainings on how to protect individuals as well as local business and industry from cyber breaches will be another benefit. People in the local service area that have minimal resources and opportunities to learn about cybersecurity will have opportunity to receive and attend trainings on how to protect themselves against cyber-attacks.

Cybersecurity has been a significant part of the Information Systems Technology program at PCCUA. The College is committed to continue the work by expanding the pathway to embed the Cybersecurity Certificate of Proficiency program into a technical certificate program which will lead to an associate of applied science degree. We plan to do this in the next year.

Finally, PCCUA can improve the program by developing business and industry partnerships which can be a significant part of the program activities to promote community awareness of cybersecurity and the need for educated, skilled technicians. The existing Advisory Council has been be utilized to provide feedback and guidance in curriculum revisions and program expansion. Their input has ensured that the cybersecurity program is meeting the needs of the local business and industry to provide a highly skilled workforce. A *Forbes* 2022 article by Chuck Brooks called "Cybersecurity in 2022-A Fresh Look at Some Very Alarming Stats" cited that the demand for workers in the cybersecurity area is soaring because cyber-attacks have increased in the corporate, education, and government/military sector. Those with baccalaureate degrees and many with associate degrees and multiple certifications, such as Cisco CCNA or Security+ from CompTIA add value to a person desiring to work in cybersecurity and definitely put students desiring to transfer to a four-year institution at an advantage for entering cybersecurity engineering programs. Those who graduate with knowledge of languages such as C, C++ Python, SQL, JavaScript, HTML are in a better position to be able to protect the security computer systems. The *2021 Forrester Report* finding in the "2021 Sate of Enterprise Breaches" found that cyber preparedness was important to protecting agencies, reducing costs, and recovering when a breach in security has occurred (Forrester is a leading global research company that helps organizations with technology research). The PCCUA cybersecurity program emphasizes preparedness as a security function and produces graduates with associate degrees and multiple cyber security certifications.