

MARYLAND HIGHER EDUCATION COMMISSION
ACADEMIC PROGRAM PROPOSAL

PROPOSAL FOR:

- NEW INSTRUCTIONAL PROGRAM
 SUBSTANTIAL EXPANSION/MAJOR MODIFICATION
 COOPERATIVE DEGREE PROGRAM
 WITHIN EXISTING RESOURCES or REQUIRING NEW RESOURCES

(For each proposed program, attach a separate cover page. For example, two cover pages would accompany a proposal for a degree program and a certificate program.)

Howard Community College
Institution Submitting Proposal

Fall 2017
Projected Implementation Date

Associate of Applied Science Information Systems Assurance
Award to be Offered Title of Proposed Program

5101-02
Suggested HEGIS Code

11.1003
Suggested CIP Code

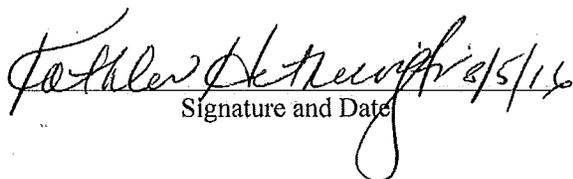
Business and Computer Systems
Department of Proposed Program

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Signature and Date

President/Chief Executive Approval

Date

Date Endorsed/Approved by Governing Board

PROPOSAL TO MARYLAND HIGHER EDUCATION COMMISSION

INTRODUCTION

The purpose of this proposal is to present information in support of Maryland Higher Education Commission's (MHEC) approval of a substantial change in Howard Community College's (HCC) associate of applied science (AAS) degree in Network Security Administration. The program title has changed to Information Systems Assurance, and the content has changed substantially. The change in this career program reflects industry requirements and better aligns student skill sets with the current technology needs. The need for professionals in this field is substantial and it is appropriate for this program to continue to effectively meet the need that exists in the industry. The workforce need for this program is significant and is addressed further in the body of this application. This program fully aligns with the 2009 Maryland State Plan for Postsecondary Education.

HCC seeks to offer up-to-date educational programs which meet student and workforce development goals and provide vital experiences to its enrollees. The college intends to remain forward-looking in terms of programs, pedagogy, and partnerships with the community and professional organizations.

A. Centrality to institutional mission statement and planning priorities

1. Description of Program

The Information Systems Assurance AAS degree is a redesign of the previous Network Security Administration AAS. This area of study is designed to meet the needs of the business community and industry in the expanding field of computer network engineering and administration. HCC's vision and mission reflect commitment to student development and success. Through its mission, the college incorporates credit programs designed to transfer, programs that lead to more immediate employment, and opportunities for community members to upgrade skills for advancement or fulfill personal interests.

The program has four areas of concentration: Cybersecurity, Network Management/Microsoft, Networking Technologies/Cisco, and VMWare Administration. Each of these areas prepares students to fill much-needed positions in the arenas of technology and network security. This area of study would be applicable for students who are entering HCC from high school, as well as career-changers and others who are interested in obtaining job-specific training and industry certifications. HCC's mission is "providing pathways to success." This program will help students obtain industry certifications and employment which will guide their pathway to success.

2. Relationship to Institutional Goals

In 2011, HCC's vice president of academic affairs commissioned a Cybersecurity Task Force to confirm the workforce need for well-trained employees and the alignment of HCC programs to help meet that need. A thorough review of programs was conducted and additional research has continued. These processes have resulted in the updated program that is presented for approval.

HCC's strategic goals are: student success, completion, and lifelong learning; organizational excellence; and building and sustaining partnerships. The Information Systems Assurance AAS is consistent with all of the segments of the college's strategic

goals. The 2012 Commission on the Future recommended development of internships, cooperative education, and mentorship opportunities in the cybersecurity field. This area of study will prepare students to meet the criteria for internships and mentorships, as well as direct entry into the job market. These efforts reflect the college's strategic goals of increasing student completion and satisfaction. The strategic goals of building and sustaining partnerships will also be addressed as partnerships with area businesses are formed to provide internship and employment opportunities for students who complete the program.

A graduate of this program will be able to:

1. Identify appropriate network topologies and equipment related to client-server environment.
2. Demonstrate the ability to install, configure, troubleshoot, and apply security configurations to various host and network devices.
3. Utilize the ability to install, configure, manage, and troubleshoot Windows Server environment.
4. Develop ethical hacking skills and apply these in countermeasures and cyber defense as necessary.
5. Identify, evaluate, and apply ethical reasoning in business practices.

B. Adequacy of curriculum design and delivery to related learning outcomes consistent with Regulation

1. Below is a listing of the program requirements. Course descriptions for this program are included in Appendix A.

Information Systems Assurance

A.A.S. Degree (Career)

APPLICATION CODE 306

For curriculum information, contact the Business and Computer Systems Division – Room DH-239 – 443-518-1520.

This area of study is designed to meet the needs of the business community and industry in the expanding field of computer network engineering and administration. Graduates will be qualified for a variety of technical and administrative positions including client needs assessment, network design, network installation and maintenance, inter-network communication and connectivity, specialized network functions, and on-site network administration. Extensive lab instruction will provide exposure to real-world network scenarios. The required courses related to major prepare students for four respected industry certification exams including: CompTIA A+, Network+, Security+, and Cisco's Certified Entry Networking Technician (CCENT). Each student will then complete additional coursework in one of the specialized areas. Students who complete the Cisco area of study will be prepared for Cisco Certified Network Associate (CCNA) Routing & Switching, CCNA Security, and CCNA Voice certifications. Students who complete the Cybersecurity area of study will be eligible for certification to the 4011 and 4013 standards by the Committee on National Security Systems (CNSS). Students who complete the VMware Administration area of study will be prepared for VMware certifications.

GENERAL EDUCATION CORE

GENERAL EDUCATION CORE		Credits
English Composition	ENGL-121 College Composition	3
Arts & Humanities	SPCH-105 Fundamentals of Public Speaking	3

Social & Behavioral Sciences	Social & Behavioral Sciences Core Group B	3
Biological & Physical Sciences	PHYS-107 Physical Science	4
Mathematics	MATH-141 College Algebra or higher core course	3
Core Electives	CMSY-110 Software Applications for Micros	3
Any General Education Core Course		2

ADDITIONAL REQUIRED COURSES

CMSY-105	Managing and Maintaining PCs and Mobile Devices I	3
CMSY-106	Managing and Maintaining PCs and Mobile Devices II	3
CMSY-158	Fundamentals and Practice for Network+ Certification	3
CMSY-162	Introduction to Network Security	3
CMSY-219	Operating Systems	3
CSCO-291	Introduction to Networking	3
CSCO-292	Routing and Switching Essentials	3
Additional Courses in Major*		18

**Students will choose 18 credits from the courses listed below according to their specific career plans. The courses are grouped into four interest areas, but students are free to select 18 credits from any area. Since this is a rapidly changing field, students should consult a faculty advisor each semester.*

Cybersecurity

This area of interest will prepare students to take a number of independent industry certification exams including CompTIA A+, Network+, Security+, and CISCO Certified Entry Networking Technician (CCENT).

CMSY-163	Introduction to Firewalls and Network Security	3
CMSY-164	Introduction to Intrusion Detection and Prevention Systems	3
CMSY-172	Introduction to Programming with JavaScript	3
CMSY-255	Introduction to Unix and Linux	3
CMSY-262	Encryption and Secure Communications	3
CMSY-263	Ethical Hacking and Cyber Defense	3

Network Management/Microsoft

This area of interest will prepare students to take a number of independent industry certification exams including CompTIA A+, Network+, Security+, CISCO Certified Entry Networking Technician (CCENT), and Microsoft Technology Associate (MTA).

BMGT-204	Taking Your Business Mobile	3
CMSY-255	Introduction to Unix and Linux	3
ELEC-140	Network Cabling Systems	3
MSFT- 251	Windows Client Configuration	3
MSFT-252	Windows Server Administration	3
MSFT-253	Active Directory Configuration	3

Networking Technologies/Cisco

This area of interest will prepare students to take a number of independent industry certification exams including CompTIA A+, Network+, Security+, Cisco Certified Entry Networking Technician (CCENT), Cisco Certified Network Associate (CCNA), CCNA Security, CCNA Voice, Cisco Certified Network Professional (CCNP) Switching, and AMP Netconnect.

CSCO-293	Scaling Networks	3
CSCO-294	Connecting Networks	3
CSCO-305	Cisco IP Telephony	3
CSCO-308	CCNA Security	3
CSCO-652	Implementing IP Switching	3
ELEC-140	Network Cabling Systems	3

VMware Administration

This area of interest will prepare students to take a number of independent industry certification exams including VMware vSphere Foundations (2V0-620), VMware Certified Associate (VCA-DCV), Certified Associate Network Virtualization (VCA-NV), Certified Associate Desktop and Mobility (VCA-DTM), Certified Professional (VCP-DCV), Network Virtualization (VCP-NV), and Certified Professional Desktop and Mobility (VCP-DTM).

VMCP-101	Introduction to Virtualization	3
VMCP-102	Virtualization of Computers, Networks, and Storage	3
VMCP-103	Installation, Configuration, and Management of vSphere	3
VMCP-104	Network and Security	3
VMCP-105	Virtualization of Network Platform	3
VMCP-106	Desktop and Mobility	3

2. Describe the educational objectives and intended student learning outcomes

Graduates will be qualified for a variety of technical and administrative positions in the arenas of networking, internet security, and virtualization. These include client needs assessment, network design, network installation and maintenance, inter-network communication and connectivity, specialized network functions, on-site network administration, and virtual administration. Extensive lab instruction will provide exposure to real-world network scenarios. The additional required courses prepare students for respected industry certification exams including: CompTIA A+, Network+, Security+, and Cisco's Certified Entry Networking Technician (CCENT). Students who complete the Cisco area of interest will be prepared for Cisco Certified Network Associate (CCNA) Routing & Switching, CCNA Security, and CCNA Voice certifications. Students who complete the Cybersecurity area of interest will be eligible for certification to the 4011 and 4013 standards by the Committee on National Security Systems (CNSS). Students who complete the VMWare Administration courses will be prepared to sit for a number of VMware industry exams. The course and program objectives are consistent with industry standards.

3. Discuss how general education requirements will be met.

In order to graduate, students will successfully complete all general education courses listed in the program. These total 21 credits, which meets the revised requirements of MHEC, as specified in the College and Career Readiness and College Completion Act of 2013. Students may take these courses in the format that best suits their learning style, whether face-to-face, online, or hybrid.

4. Identify any specialized accreditation or graduate certification requirements for this program and its students.

There are no specialized accreditation or certification requirements for this program. Students may enter this program without prior learning experience. Students may choose

18 credits from the four areas of interest. They must take courses in prescribed order only where prerequisites are required. In addition to the academic credit earned, students may also sit for specific industry exams to gain industry-recognized credentials. Students may obtain specialized industry certifications while participating in the program.

5. If contracting with another institution or non-collegiate organization, provide a copy of the written contract.

Howard Community College is not contracting with another institution or non-collegiate organization in the delivery of this program.

C. Critical and compelling regional or Statewide need as identified in the State Plan

1. Demonstrate demand and need for program in terms of meeting present and future needs of the region and the state.

The need for cybersecurity workers is great in the state of Maryland. In particular, HCC's location in the Baltimore/Washington DC corridor makes it a good choice for new students, as well as workers who desire to upgrade their skills. The need for well-trained information technology workers well outpaces the number of job-ready applicants. Maryland is home to over 50 major Federal and commercial agencies and research facilities that rely on a workforce that has up-to-date cybersecurity and information technology training. According to a July 2013 report by the Economic Alliance of Greater Baltimore, "there are over 75,000 employed in cybersecurity-related jobs in the greater Baltimore/central Maryland region and there are nearly 20,000 open cybersecurity job positions in Maryland. Many of the region's largest IT and defense contractors are among employers with the most cybersecurity job openings." The report can be found at this link: <http://www.greaterbaltimore.org/portals/default/publications/Industrypercent20Profiles/it.pdf>.

HCC is a partner in the Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program, which focuses on preparing Marylanders for jobs in the cybersecurity and cyber forensics fields. One of the grant activities focuses on partnering with area businesses to increase intern and job opportunities. HCC has a broad student base with representation from diverse backgrounds, as seen in the campus profile provided in Appendix B. The program will be offered through varied delivery modes and at a cost aligned with the community. Student characteristics such as age, gender, ethnicity, and goals reveal widespread variations. The college, through implementation of its academic strategic plan, focuses on the learning needs of the student. HCC's mission clearly states that we exist to "provide pathways to success." Faculty, administration, and staff view this as their primary purpose.

Finally, this updated program will lead to an increase in qualified workforce within the state of Maryland. There is evidence that the students who do and will enroll in the revised offerings address the state's goal of "ensuring equal opportunity for Maryland's diverse citizenry." A look at the demographics of HCC's students in the existing Network Security Administration AAS program (below) illustrates this and it is not expected to change significantly. The demographic data for this program reflects an increase in black or African American students as compared to the overall data for the college.

Race	2014FA		2013FA		2012FA		2011FA		2010FA	
	Value	Pct of Total								
White	4	21.1%	7	30.4%	7	36.8%	9	33.3%	13	56.5%
Asian	3	15.8%	4	17.4%	1	5.3%	1	3.7%	2	8.7%
Black or African America	11	57.9%	9	39.1%	6	31.6%	12	44.4%	7	30.4%
Two or More Races	1	5.3%			2	10.5%	1	3.7%		
Hispanic			3	13.0%	3	15.8%	3	11.1%	1	4.3%
Am Indian/Alaska Native							1	3.7%		

The information assurance field is rapidly changing and requires the workforce to continue to expand its knowledge base. This program reflects up-to-date coursework that provides students with hands-on opportunities to use state-of-the-art computer systems, including virtual environments. These deployment methods provide the impetus needed to continually address the changing landscape of information assurance knowledge and practices.

The pronounced industry need for trained workers provides for inclusivity of minority students as well as veterans and adult learners. Courses are offered in a variety of formats and timeframes which allows for ease of enrollment for a larger, more diverse population.

HCC is not a historically black institution (HBI). However, as seen in the chart above, the college provides programs to a variety of student demographics. HCC does not have a negative impact on the three HBIs in the area.

2. Provide evidence that the perceived need is consistent with the Maryland State Plan for Postsecondary Education

The 2009 Maryland State Plan for Postsecondary Education notes a shrinking high school graduate cohort, the need to attend to the needs of minority and diverse students, and the importance of improving retention and graduation rates. The State Plan also cites the appropriateness of more flexible schedules and more opportunities to be positioned for workforce needs. The proposed program and its implementation are in line with these advisories.

The State Plan cites the issues of accessibility, diversity, and the impact of technology application in course and program delivery. This program, offered by a community college and utilizing varied pedagogies, addresses these issues. There are many government agencies and private companies in this locale that are in the information assurance field. Well-trained workers in this field are in great need and there are many unfilled positions.

D. Quantifiable and reliable evidence and documentation of market supply and demand in the region and the State.

1. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program.

According to the 2015 Bureau of Labor Statistics Occupational Employment Statistics (OES) (<http://www.bls.gov/ooh/computer-and-information-technology/home.htm>), careers in network systems and information security are expected to grow by 12 percent from 2014 to 2024, which is faster than average for all occupations. OES data indicates that this area

is one of the most concentrated markets in the U.S., with 42 percent more of its employment concentrated in cybersecurity occupations than the U.S. average.

The Economic Alliance of Greater Baltimore (www.greaterbaltimore.org) published industry profiles; some of the findings, based on information as of 2012, are listed below.

- Maryland has over 19,000 job openings in cybersecurity.
- The Baltimore/Washington, DC region employs more IT workers than any other region in the country.
- There are more than 10,000 cybersecurity/information technology contracting companies in the state of Maryland.
- The Federal government expected to spend over \$40 billion on non-military IT in 2013.

The large number of contractors and the proximity to multiple government agencies provides significant job opportunities for graduates of this program.

Steve Morgan of the Cybersecurity Business Report (July 2015) states, "The need for more cyber-workers explains why infosecurity is considered one of the best jobs out there - for the next seven years. U.S. News and World Report ranked a career in information security analysis eighth on its list of the 100 best jobs for 2015. They state the profession is growing at a rate of 36.5 percent through 2022."

2. Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.

The National Initiative for Cybersecurity Careers and Studies (NICCS) website (<https://niccs.us-cert.gov/>) states that "The cybersecurity career field is constantly growing and changing. There is an increasing number of cybersecurity degree programs, and there are also many degree programs that can lead to careers in the cybersecurity field. The degree programs can provide students with the technical skills needed in the cybersecurity field." In addition to degree programs, industry certifications add marketability to graduates of the program.

Review of positions in the cybersecurity and information technology fields on O*NET OnLine (<http://www.onetonline.org/>), an online job information site sponsored by the U.S. Department of Labor, indicates that there are positions, such as computer systems analysts and computer network support specialists in these fields that can be obtained with an associate's degree. Additionally, positions in the computer and information technology fields are listed as "Bright Outlook" careers. Bright Outlook occupations are expected to grow rapidly over the next several years, will have large numbers of job openings, or are new and emerging occupations.

The Economic Alliance of Greater Baltimore market report on cybersecurity (2013) indicates that Maryland has over 19,000 job openings in cybersecurity. "Cybersecurity leaders have expressed difficulty in filling specialized and technical roles in the industry with qualified professionals. The Baltimore-Washington corridor has produced a strong pipeline of graduates with cybersecurity knowledge and experience prepared to succeed in job opportunities presented by the expanding industry."

3. Data showing the current and projected supply of prospective graduates.

The college's data collected over the past three years indicates that graduation rates from the Network Security Administration AAS program remain steady. It is expected that the proposed program change will increase enrollment and graduation rates. It is expected that graduation rates will increase at a rate of one percent over the next three years; then increase to a rate of two percent in following years. The opportunity to receive training in a wide variety of information technology areas and to obtain industry certifications will add to the value and enrollment in the degree.

Other factors exist that will have a positive influence on enrollment and graduation rates in this program:

- HCC is a member of CyberWATCH, a consortium of Washington, DC, Maryland, and Virginia institutions led by Prince George's Community College and funded by the National Science Foundation (NSF) to expand the number of technicians and professionals with requisite skills in cybersecurity, and to improve the quality and increase the awareness of cybersecurity and information assurance in the education and business community. The CyberWATCH internship program provides students with training opportunities and real-world experience in the areas of cybersecurity and information assurance. A variety of summer internship opportunities is offered along with job-readiness skills training. CyberWATCH partners with local businesses and IT professionals to give students a unique opportunity to learn valuable skills and job experience to explore an industry they hope to move into. Internships may also lead to future job prospects. CyberWATCH students are matched with local businesses based on their interests, academic experience, and skill levels.
- The National Security Administration (NSA)/Central Security Service (CSS) website indicates a strong commitment to providing an educated workforce in the cybersecurity, information technology arena. "At the NSA/CSS, we believe that securing our nation's future requires a strong commitment to the education of America's future generations." This quote from the NSA/CSS website (<https://www.nsa.gov/academia/index.shtml>) indicates the strong commitment to providing an educated workforce in the cybersecurity, information technology arena. Also from the NSA website: "In support of this critical commitment, NSA/CSS maintains numerous academic partnerships at every phase of the educational process. Our commitment starts in the local community and extends across the country to provide numerous education opportunities for American students." HCC is designated as a Center of Academic Excellence (CAE) by NSA and the Department of Homeland Security; therefore, students who take the network security courses have a valuable credential with regard to the job market.

Greater Baltimore boasts one of the most talented workforces in the nation and has an elite network of secondary and post-secondary institutions. More than 340,000 students attend Maryland's 59 accredited two-year or four-year colleges and universities. Additionally, Maryland's 16 community colleges, spanning a network of 21 campuses, serve over 400,000 students annually. The highly educated workforce serves as the foundation for growth in the region's diversified business base, including IT, cyber, biosciences, health care, financial services, government contracting, manufacturing, logistics, and legal services.

E. Reasonableness of program duplication

1. Identify similar programs in the state and/or same geographical area. Discuss similarities and differences between the proposed program and others in the same degree to be awarded.

Below is a table that lists programs offered by other Maryland community colleges. Due to the demand for workers in this field, the need exists for programs in local community colleges. Each community college serves its local community. In addition to serving Howard County citizens, due to its critical location in the Baltimore/Washington corridor, HCC is able to serve students in a greater area. The proposed change in the program will keep the Information Systems Assurance AAS program relevant and provide up-to-date information with hands-on opportunities for students, thus allowing them to be job-ready upon completion of the program. This program appeals to traditional age students as well as those who are interested in receiving additional training in their current field or in making a career transition.

COLLEGE	CAREER PROGRAMS/CERTIFICATES	PREPARATION FOR INDUSTRY CERTIFICATIONS
Allegany College: http://www.allegany.edu/	Degrees and Certificates: <ul style="list-style-type: none"> • Associate of Science in Cybersecurity • Associate of Applied Science in Cybersecurity • Cybersecurity Certificate 	<ul style="list-style-type: none"> • Comp TIA A+ • Comp TIA Security+ • Cisco CCNA
Anne Arundel Community College: http://www.aacc.edu	Degrees and Certificates: <ul style="list-style-type: none"> • A.A.S. in Information Assurance and Cybersecurity Option • A.A.S. in Information Assurance and Cyber Forensics Option Computer • A.A.S. in Network Management • Computer Network Management • Network Security Certificate • Advanced Network Security Certificate • Server Admin and Security Certificate • Cyber Forensics Certificate • Advanced cyber forensics Certificate 	<ul style="list-style-type: none"> • Cyber Forensics Certificates • Cisco CCNA • Computer Network Management Certificate • Computer Network Management UNIX/LINUX System Administrator Certificate • Cyber Technology Certificate • Network Security Certificates • Server Administration and Security Certificate

COLLEGE	CAREER PROGRAMS/CERTIFICATES	PREPARATION FOR INDUSTRY CERTIFICATIONS
Baltimore City Community College: http://www.bccc.edu/	Degrees and Certificates: <ul style="list-style-type: none"> • Cybersecurity and Assurance Certificate 	
Carroll Community College: http://www.carrollcc.edu/	Degree and Certificate: <ul style="list-style-type: none"> • A.A.S. is in development • Network Security and non-credit certification preparation courses are available. 	<ul style="list-style-type: none"> • CompTIA A+ • CompTIA Network+ • CompTIA Security+ • Cisco Certified Entry Networking Technician (CCENT) • Microsoft Certified Professional (MCP)
Cecil Community College: http://www.cecil.edu/	Degree and Certificate: <ul style="list-style-type: none"> • A.A.S in CyberSecurity • Cybersecurity Certificate 	
Chesapeake College: http://www.chesapeake.edu/	Degree: <ul style="list-style-type: none"> • A.A.S in Cybersecurity; offered in conjunction with A.A. Community College 	<ul style="list-style-type: none"> • Network+ • Security+ • Cisco CCNA • SCNP (Security Certified Network Professional)
College of Southern Maryland: http://www.csmd.edu/	Degree and Certificate: <ul style="list-style-type: none"> • A.A.S in CyberSecurity • CyberSecurity Technology Certificate 	<ul style="list-style-type: none"> • Pending MHEC Approval - • CCNET
Community College of Baltimore County: http://www.cbcmd.edu/	Degree and Certificate: <ul style="list-style-type: none"> • A.A.S in Information Systems Security • Information Systems Security Certificate 	
Frederick Community College: http://www.frederick.edu/	Degree and Certificate: <ul style="list-style-type: none"> • A.A.S in Cybersecurity • Cybersecurity Certificate 	<ul style="list-style-type: none"> • A+ • Network+ • Security+ • Certified Ethical Hacker (CEH)

COLLEGE	CAREER PROGRAMS/CERTIFICATES	PREPARATION FOR INDUSTRY CERTIFICATIONS
		<ul style="list-style-type: none"> • Certified Information Systems Security Professional (CISSP) • Certified Information Security Auditor (CISA)
Garrett College http://www.garrettcollege.edu/	Degrees and Certificates: <ul style="list-style-type: none"> • A.A.S. Cybersecurity • A.A.S. Network Administration • Cybersecurity Certificate • Network Administration Certificate 	
Hagerstown Community College: http://www.hagerstowncc.edu/	Degrees and Certificates: <ul style="list-style-type: none"> • A.A.S., Cybersecurity, • Advanced Network Security, Cybersecurity Certificate • Cisco CCNA Prep, Cybersecurity Certificate • Network Security, Cybersecurity Certificate 	<ul style="list-style-type: none"> • CompTIA A+ • Network+ • Security + • Certified Ethical Hacker (CEH) • Certified Information Systems Security Professional (CISSP) • Certified Information Security Auditor (CISA)
Harford Community College: http://www.harford.edu/	Degrees and Certificates: <ul style="list-style-type: none"> • A.A.S., Information Assurance and Cybersecurity A.A.S. 	<ul style="list-style-type: none"> • CompTIA Advanced Security Practice (CASP) • Certified Information Systems Security Professional
Montgomery College: http://cms.montgomerycollege.edu/EDU/	Degrees and Certificates: <ul style="list-style-type: none"> • A.A.S. in Cybersecurity and Networking 	<ul style="list-style-type: none"> • CompTIA • A+ • Network+ • Security+ • MCIPT • CCNA • CISSP • SCNP
Prince George's Community College: https://www.pgcc.edu/	Degree and Certificate: <ul style="list-style-type: none"> • A.A.S. in Cybersecurity • Cybersecurity Management or Cybersecurity Certificate 	<ul style="list-style-type: none"> • A+ • CCNA • Network+ • Security+

COLLEGE	CAREER PROGRAMS/CERTIFICATES	PREPARATION FOR INDUSTRY CERTIFICATIONS
		<ul style="list-style-type: none"> • SCNP
Wor-Wic Community College: http://www.worwic.edu/	Degrees and Certificates: <ul style="list-style-type: none"> • A.A. in Computer Technology • A.A.S. in Computer & Network Support technology option; Programming & internet technology option; Computer Technology • Certificate in Computer Information Security option; Computer Software Technician option; Computer Technology 	<ul style="list-style-type: none"> • A+

F. Relevance to Historically Black Institutions (HBIs)

There are three HBIs in the area. This program update is not in conflict since each college serves constituents within its own population. It is not anticipated that this program change will impact the HBIs. No impact on uniqueness, institutional identities, or mission of HBIs is anticipated. Each institution offers viable programs for their citizenry.

G. If proposing a distance education program, please provide evidence of the Principles of Good Practice.

The Information Systems Assurance AAS program is not a distance education program.

H. Adequacy of faculty resources

Faculty members who teach in this program are well qualified, both in education and industry experience. The table below lists the faculty who currently teach courses in this program.

Information Systems Assurance AAS Faculty

Faculty Name	Degree Title/Field	Academic Rank	Contract type	Full-time/Part-time	Courses
Ayane, Mengistu	Ph.D., Economics Management Computer Networks & Applied Programming	Associate Professor	Continuing	Full-time	CMSY-162 CMSY-163 CMSY-164
Bielski, John	B.A., Philosophy	Assistant Professor	Probationary	Full-time	CMSY-219
Doherty, James	M.A., Computer Science, Computer Networking and Telecommunications	Adjunct Instructor	Semester	Part-time	CMSY-171/281 CMSY-163
Edwards, Charles	Ph.D., Information Systems	Associate Professor	Probationary	Full-time	Programming courses
Frolov, Nina	Ph.D., Business Administration	Adjunct Instructor	Semester	Part-time	BMGT-204 CMSY-212

Faculty Name	Degree Title/Field	Academic Rank	Contract type	Full-time/Part-time	Courses
	<i>Specialization: Homeland Security, Leadership, and Policy</i> Completion expected December 2016				
Hennick, Michael	M.P.S., Cybersecurity	Adjunct Instructor	Semester	Part-time	CMSY-263
Hogan, Paul	Pursuing a B.S.in Computer and Information Science; A.A. Information Technology	Adjunct Instructor	Semester	Part-time	CMSY-219 CMSY-172
Kearns, Thomas	M.S., Computer Science	Adjunct Instructor	Semester	Part-time	CMSY-255 CMSY-256
Kim, Kevin	B.S., Network Administration	Adjunct Instructor	Semester	Part-time	CSCO-651 CSCO-652
Lee, Sung	Director, Student Computer Support, HCC (full-time staff position)	Adjunct Instructor	Semester	Part-time	CMSY-164
Lohin, Daniel	M.S., Information Security and Assurance	Adjunct Instructor	Semester	Part-time	CMSY-262
Mitchell, Pamela	B.S., Computer Information Computer Systems	Instructor	Probationary	Full-time	CMSY-158 VMCP courses
Quinn, Mark	M.S., Computer Science; M.A., Education	Associate Professor	Probationary	Full-time	CMSY-105 CMSY-106
Siebs, John	M.A., Sociology	Assistant Professor	Continuing	Full-time	CSCO-291 CSCO-292
Soyza, Wijeymuni	M.Sc., Computer Science	Adjunct Instructor	Semester	Part-time	CSCO-291 CSCO-292
Taylor, B.	A.A.S., Network Security Administration; A.A., Information Technology - Network Security; A.A., Engineering	Adjunct Instructor	Semester	Part-time	CMSY-105 CMSY-106
Town, Brian	B.S., Information Technology	Adjunct Instructor	Semester	Part-time	CMSY-162
Volynskiy, Rozaliya	M.S., Engineering and Education	Professor	Continuing	Full-time	Department Chairperson

I. Adequacy of library resources

The James Clark, Jr. Library offers a wide array of print and online resources that provides adequate resources for the proposed program. From the library's web site, individuals can search the online catalog for approximately 68,000 items, including books, e-books, and audiovisual titles. The library has 30,032 books and audiovisual titles as well as 39,084 e-books. Of these, the library has 99 books and 839 e-books on subjects related to the Information Assurance Systems A.A.S. program. Library resources may be used or borrowed by current HCC students, faculty, and staff using their HCC ID card.

The library also provides access to e-journals through online database subscriptions. Off-campus access to databases, e-journals, e-books, and online course reserves is available to the college community via a current HCC login and password.

Research assistance is available at the library service desk, by appointment, and via email. Classes and online learning objects for information literacy instruction are regularly offered. The library offers a comfortable environment for quiet study. Group study rooms in the library may be reserved. Computers are available for research and writing and there is wireless connection and power outlets for mobile devices.

Program faculty may recommend materials for the library collection. First priority will be given to those materials that support the instructional program. Orders for previewing of high-cost video and multimedia items may be arranged through the library. Specialized materials not available in the library and not appropriate for purchase for the College's collection may be requested by faculty through interlibrary loan.

J. Adequacy of physical facilities, infrastructure and instructional equipment.

HCC has a Facilities Master Plan which guides the future campus growth in a way that supports HCC's mission, vision, and values.

Courses in the Information Systems Assurance AAS are taught in computer classrooms in Duncan Hall or the Science and Technology building. The student capacity in computer classrooms is 24. In these classrooms, each student has either one or two computer monitors and the instructor station is equipped with two monitors. Classrooms are equipped with software and hardware required for state-of-the-art instruction pertinent to course content.

In addition to the classroom labs, the cybersecurity lab is used for additional hands-on labs. Computers are equipped with needed hardware and software to accommodate effective teaching and learning. There is a technical environment with dedicated servers and virtualization servers using VMWare software. Currently under construction, HCC will have a new science, engineering, and technology building which will include a state-of-the-art cyber lab. It is expected that classes will be held in the new facility beginning Fall 2017.

K. Adequacy of financial resources with documentation

Resources: The Information Systems Assurance AAS program is a revised version of the previously existing Network Security Administration AAS. The data from the pre-existing program are incorporated into the foundation of this proposal in calculating the number of students, credits, and resources.

Reallocated Funds: Monies previously spent for the Network Security Administration program will be reassigned to the Information Systems Assurance program. This is seen in the Reallocated Funds for Years 1 through Year 5. Based on the FY15 data, and using enrollment in the previous Network Security Administration program as the foundation, the program expenditures total \$58,727 and reflect two percent of the Business and Computer Systems division budget.

Tuition and Fee Revenue: The calculations for tuition and fees are initially based on the previous network security enrollments, with a 10 percent increase reflected in Year 3 and

again in Year 5. This is a modest increase which reflects some stability college-wide and an anticipated enhanced recruitment over the five-year period.

College data indicate that fulltime (FT) students enroll in an average of 13 credits per semester, while part-time (PT) students enroll in about 6 credits per semester. These numbers are used to calculate tuition and fee resources. The current tuition and fee structure is the same for FT and PT students, i.e. \$132 per credit for tuition and \$21 per credit for the consolidated fee. This results in total revenue of \$153 for each credit taken, whether by a FT or PT student.

The tuition and fees are shown for newly entering students and continuing students as the years progress. An annual attrition of 10 percent, consistent with past enrollment, is incorporated.

Other Sources: Course fees vary from \$50 to \$100 per program course. Based on average credit load, FT students would take about 8.6 courses within the program courses annually, while PT students would take 4 courses. The enrollment is projected for each year of the program and is based on anticipated course offerings in each year. The revenue from course fees increases slightly as enrollment increases. A 10 percent annual attrition is applied and is consistent with division data.

Table 1: RESOURCES

Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	\$58,727	\$58,727	\$58,727	\$58,727	\$58,727
2. Tuition/Fee Revenue (c + g below)	\$124,542	\$233,784	\$247,248	\$262,548	\$272,034
a. Number of F/T Students	<u>New</u> 17	<u>New</u> 17 <u>Returning</u> 15	<u>New</u> 19 <u>Returning</u> 15	<u>New</u> 19 <u>Returning</u> 17	<u>New</u> 20 <u>Returning</u> 17
b. Annual Tuition/Fee Rate	\$3,978	\$3,978	\$3,978	\$3,978	\$3,978
c. Total F/T Revenue (a x b)	\$67,626	<u>New</u> \$67,626 <u>Returning</u> \$59,670	<u>New</u> \$75,582 <u>Returning</u> \$59,670	<u>New</u> \$75,582 <u>Returning</u> \$67,626	<u>New</u> \$79,560 <u>Returning</u> \$67,626
d. Number of P/T Students	<u>New</u> 31	<u>New</u> 31 <u>Returning</u> 27	<u>New</u> 34 <u>Returning</u> 27	<u>New</u> 34 <u>Returning</u> 31	<u>New</u> 37 <u>Returning</u> 31
e. Credit Hour Rate	\$153	\$153	\$153	\$153	\$153

f. Annual Credit Hour Rate	\$1,836	\$1,836	\$1,836	\$1,836	\$1,836
g. Total P/Y Revenue (d x f)	\$56,916	<u>New</u> \$56,916 <u>Returning</u> \$49,572	<u>New</u> \$62,424 <u>Returning</u> \$49,572	<u>New</u> \$62,424 <u>Returning</u> \$56,916	<u>New</u> \$67,932 <u>Returning</u> \$56,916
3. Grants, Contracts & Other External Sources					
4. Other Sources (Course Fees)	\$21,050	\$34,900	\$35,750	\$37,600	\$38,800
Total (Add 1-4)	\$204,319	\$327,411	\$341,725	\$358,875	\$369,561

EXPENDITURES:

Faculty

Based on the current number of FT faculty in the division, and the number of FTEs and course sections that will be appropriated to the newly revised program, one FT faculty will be needed to teach the courses in Year one, along with three PT faculty. In each of the succeeding years, as the more specialized options are offered, PT faculty will be needed. Existing technology programs currently have FT faculty who teach some courses in the Information Systems Assurance program. This is calculated to account for 18 sections per year in years two through five. The remaining sections will be covered by one FT faculty and between 0.1 and 0.5 PT faculty.

The current mid-level PT faculty rate of \$770/credit and the average full-time faculty salary of \$60,000 are used. Benefits for each FT faculty and staff are calculated by the college to be \$15,000; part-time faculty receive 7.65 percent in FICA.

Administrative Staff

The Information Systems Assurance program, in terms of needs for administrative support, is considered nine percent of the division's technical programs. Using the FY15 administrative budget of \$90,210 as reference, this equals nine percent, or \$11,846, plus benefits of \$1,500. Since enrollment increases are projected to be modest, there are no adjustments in this category over the five years.

Support Staff

This category of personnel is appropriate to the program, especially as it relates to lab staffing and oversight of technical operations. Funds for this category are applied to this program at a rate of nine percent of the FY15 budget of \$131,631. The resulting \$8,188 also carries benefits costs of \$1,350. This staffing is not directly related to enrollment increases, so no increase over the five years is included.

Equipment

Equipment is provided to a small extent by the division and the monies noted constitute nine percent of the total expended in FY15. Additionally, the college uses end-of-year monies to fill other requests for equipment. That amount is not predictable, and is not included.

Library

The expenditures for this category are based on the reports from the library produced in FY15 and the pro-rated enrollment in the programs.

Table 2: EXPENDITURES					
	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	\$82,363	\$77,454	\$82,363	\$82,363	\$84,818
a. #FTE	1.4	1.1	1.4	1.4	1.5
b. Total Salary	\$66,840	\$62,280	\$66,840	\$66,840	\$69,120
c. Total Benefits	\$15,523	\$15,174	\$15,523	\$15,523	\$15,698
2. Admin. Staff (b + c below)	\$13,196	\$13,196	\$13,196	\$13,196	\$13,196
a. #FTE	.09	.09	.09	.09	.09
b. Total Salary	\$11,846	\$11,846	\$11,846	\$11,846	\$11,846
c. Total Benefits	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350
3. Support Staff (b + c below)	\$9,538	\$9,538	\$9,538	\$9,538	\$9,538
a. # FTE	.09	.09	.05	.05	.05
b. Total Salary	\$8,188	\$8,188	\$8,188	\$8,188	\$8,188
c. Total Benefits	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350
4. Equipment	\$680	\$680	\$780	\$780	\$780
5. Library	\$400	\$400	\$500	\$500	\$500
6. New or Renovated Space	0	0	0	0	0
7. Other Expenses	0	0	0	0	0

Total (Add 1-7)	\$106,177	\$101,268	\$106,377	\$106,377	\$108,832
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L. Adequacy of provisions for evaluation of program

The division assessment efforts are in line with institutional efforts and the unit's mission and divisional goals. A broad range of objects and processes is incorporated in assessment efforts and the span extends to learning outcomes and operational assessment. The overriding paradigm is that outcomes assessment is not an end in itself, but a vehicle that drives operations to meet desirable ends, whether that is pre-determined or developed as a result of the assessment process. The results of assessment need to be integrated into strategic and day-to-day operations, as appropriate. This process culminates in recognition of achievements as well as identification of areas of lower performance and projected modifications to improve function. HCC uses multiple sources to enrich the assessment process.

HCC has a planned schedule to review all courses and programs over a five year period. The Business and Computer Systems division participates in the college-wide assessment schedule. Pursuant to that schedule, this program and many of the courses within the program are scheduled for review in FY17. Data will be gathered per the program review criteria. Due to the fact that this program has just had a major revision, data collected may reflect a change in some specific information.

In addition to the program review process, programs and courses are reviewed annually by the administration of the college-wide Yearly Evaluation of Student Services (YESS). IDEA surveys are also administered to students each major semester to gather their input regarding the adequacy of instruction. The IDEA survey was originated at Kansas State University and is widely used across colleges. Changes in the industry and the directives of involved agencies will be reviewed on an annual basis to determine needed modifications in programs. The program will also undergo annual division review to acquire data on the program's viability.

M. Consistency with the State's minority student achievement goals

HCC is committed to providing equal opportunity to all students. The college has undertaken an affirmative action plan to enhance equality of opportunity and the recruitment of minorities. The chart on page 6 describes the ethnicity of students enrolled in this program and reflects a consistency in minority enrollment. The academic student support and career services department offers support for students through resources such as tutoring, workshops, and information on all campus resources. In addition to these resources that are available to all students, there is a mentorship and academic achievement program available for black male students, as well as an academic achievement program directed toward Hispanic/Latino students.

N. Relationship to low productivity programs identified by the Commission

This program is not a low productivity program and does not replace such a program. Enrollment will be healthy and will be sustained. The only monies "redistributed" are the \$58,272 shown in Table 1. This represents previous funds ascribed to the previous program that is being replaced by the newly revised program.

Appendix A Course Descriptions

BMGT-204 Taking Your Business Mobile

3 credits

In this course the student will learn how to improve personal and business productivity using mobile computing devices. The student will analyze the similarities and differences between mobile devices, servers, applications and how mobile technology can improve business. "Smart phone" models will be discussed, and students will learn skills and strategies using them. Students will use mobile phones in class assignments. (3 hours weekly)

CMSY-105 Managing and Maintaining PCs and Mobile Devices I

3 credits

Upon completion of this course, students will have a basic understanding of the function and operation of the major elements of personal computer systems, laptops, tablets, and mobile devices, and how to localize and correct common hardware and software problems. Students will have hands-on, real-world experience to reinforce the concepts. Special emphasis will be placed on how systems are configured, modified, and expanded to meet new requirements. This course, along with CMSY-106, prepares students for A+ certification offered by the Computing Technology Industry Association (CompTIA). (2 hours lecture, 3 hours lab weekly)

CMSY-106 Managing and Maintaining PCs and Mobile Devices II

3 credits

In this course, students will gain the ability to troubleshoot hardware and software problems for personal computer systems, laptops, tablets, and mobile devices. Students will have hands-on, real-world experience in setting up a local area network (LAN) and configurations. Students will also have hands-on experience in supporting notebooks and mobile devices. This course, along with CMSY-105, prepares students for A+ Certification offered by the Computing Technology Industry Association (CompTIA). (2 hours lecture, 3 hours lab weekly)

CMSY-158 Fundamentals and Practice for Network+ Certification

3 credits

This course is designed to give students the knowledge and experience to install and configure the TCP/IP client, and design, install, and configure computer networks. The course will introduce students to computer networking fundamentals helping them to understand how cables, connectors, networking devices, ethernet, clients, and servers work together. Furthermore, it also equips students with the fundamentals of how local area networks (LANs), wireless networks (WLANs), and wide area networks (WANs) work. Students are taught how to setup and configure their own small networks and configure LANs with aspects of network security in place. Some troubleshooting techniques are also covered in the course. A fairly good understanding of computer operating system (OS) such as DOS is an advantage, but not a requirement. Corequisite: CMSY-162. (2 hours lecture, 2 hours lab weekly)

CMSY-162 Introduction to Network Security Systems

3 credits

This course is designed to introduce students to the fundamentals of network security in preparation for advanced courses. It will give students a solid foundation for understanding different security technologies and how they function. Students will be able to design a basic network with the proper network security structures in place. This course is designed as an entry-level Information Assurance course, but it is highly recommended that students have a

background in computer and network administration. After taking this course, students should be prepared to take the CompTIA Security+ exam. A good understanding of the Windows and Linux operating systems, and TCP/IP protocol, or an extensive background in network administration is highly recommended. Corequisite: CMSY-158 or appropriate CMSY placement test score. (2 hours lecture, 2 hours lab weekly)

CMSY-163 Introduction to Firewalls and Network Security

3 credits

This course is designed to give students experience with firewall hardware and software. Different firewall systems will be illustrated, and students will be given the opportunity to install and configure them. The course is designed with a network administrator in mind. An extensive background in network administration, or a computer professional with an MCSE or equivalent would have adequate background knowledge for waiver. Prerequisites: CMSY-162. (3 hours lecture, 1 hour lab weekly)

CMSY-164 Introduction to Intrusion Detection and Prevention Systems

3 credits

From this introduction to intrusion detection and prevention systems (IDPS), students will develop a solid foundation for understanding IDPS and how they function. This course will give students a background in the technology of detecting network attacks. It will introduce all the concepts and procedures used for IDPS. Students will have hands-on experience with implementing and configuring software- and hardware-based IDPS in a network infrastructure. This course is designed with a network administrator in mind. A student with a fairly extensive background in network administration or a computer professional with an MCSE or equivalent would have adequate background knowledge for waiver. Prerequisites: CMSY-162 or CMSY-163. (2 hours lecture, 2 hours lab weekly)

CMSY-172 Introduction to Programming with JavaScript

3 credits

This course is an introduction to computer programming using JavaScript programming language. It will present the beginning to intermediate topics necessary to create, design, write, test, debug, and document programs for execution in a web browser. This course is designed to teach students how to add interactive capabilities to websites and web applications, how to develop programs utilizing the software development life cycle methodology, and the foundational skills needed for learning other programming languages. It is assumed that students are familiar with HTML and file management. (3 hours weekly)

CMSY-219 Operating Systems

3 credits

In this course, students will examine the operation of the system software of a computer. The student will be able to use the system commands to create and alter the computer environment. The goal of this course is to familiarize each student with the operating system software, define the role of the software, and to train each student in the proper use of the operating system software. Prerequisite: CMSY-110 or CADD-101. (2 hours lecture, 3 hours lab weekly)

CMSY-255 Introduction to Unix and Linux

3 credits

The course provides an introduction to the Unix and Linux operating systems. The goal of this course is to provide students with an understanding of the Unix and Linux command line so that students will be able to customize a Unix/Linux environment under the Shell environment. (2 hours lecture, 2 hours lab weekly)

CMSY-262 Encryption and Secure Communications

3 credits

This course will instruct students on how to leverage and apply the principles of encryption to protect data at rest and in transit over potentially insecure networks. The history and concepts of cryptography will be discussed as well as common tools/practices to encrypt data and store/transmit it securely. Concepts of virtual private network (VPN) technologies and secure email will become an integral part of the students' skill set. This course is designed with a network administrator in mind. A student with a fairly extensive background in network administration, or a computer professional with an MCSE or equivalent would have adequate background knowledge for waiver. Prerequisites: CMSY-162 and CMSY-163. (2 hours lecture, 2 hours lab weekly)

CMSY-263 Ethical Hacking and Cyber Defense

3 credits

This course is designed to introduce students to the fundamentals of scanning, testing, hacking, and securing computer systems and networks. Students learn how intruders escalate privileges and what steps can be taken to secure network systems. Students will also learn about Policy Creation, Social Engineering, Distributed Denial of Service (DDoS) and Web Server Attacks, Buffer Overflows, and Virus Creation. This will give students a solid foundation for understanding different security technologies and how they function. The course is delivered using practical real-time demonstration of the latest hacking and penetration testing techniques, methods, tools, tricks, and security measures. This course is designed as an entry-level Information Assurance course, but will significantly benefit system and network administrators, auditors, network security professionals, and anyone who is interested in acquiring the skills of an ethical hacker. It is highly recommended that students have a background in computer and network administration. The course prepares students to take EC-Council Certified Ethical Hacker exam. Prerequisites: CMSY-163 and CMSY-164. (2 hours lecture, 2 hours lab weekly)

CSCO-291 Introduction to Networks

3 credits

The focus of this course is on learning the fundamentals of networking. Topics include: the architecture, structure, functions, components, and models of the Internet and other computer networks; the principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations; basic router and switch configuration; and implementation of IP addressing schemes. Prerequisite: CMSY-106 or CMSY-158.

CSCO-292 Routing and Switching Essentials

3 credits

This course describes the architecture, components, and operations of routers and switches in a small network. Students learn how to configure a router and a switch for basic functionality. By the end of this course, students will be able to configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPv2, single-area OSPF, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks. Prerequisite: CSCO-291. (2 hours lecture, 3 hours lab weekly)

CSCO-293 Scaling Networks

3 credits

This course describes the architecture, components, and operations of routers and switches in a larger and more complex network. Students learn how to configure routers and switches for advanced functionality. By the end of this course, students will be able to configure and

troubleshoot routers and switches and resolve common issues with OSPF, EIGRP, STP, and VTP in both IPv4 and IPv6 networks. Students will also develop the knowledge and skills needed to implement DHCP and DNS operations in a network. Prerequisite: CSCO-292. (2 hours lecture, 3 hours lab weekly)

CSCO-294 Connecting Networks

3 credits

This course discusses the WAN technologies and network services required by converged applications in a complex network. The course enables students to understand the selection criteria of network devices and WAN technologies to meet network requirements. Students learn how to configure and troubleshoot network devices and resolve common issues with data link protocols. Students will also develop the knowledge and skills needed to implement IPsec and virtual private network (VPN) operations in a complex network. Prerequisite: CSCO-293. (2 hours lecture, 3 hours lab weekly)

CSCO-305 Cisco IP Telephony

3 credits

This course concentrates on the fundamental elements of Voice over Internet Protocol (VoIP) calls, the description of dial plans, and the implementation of gateways, gatekeepers, and IP-IP gateways. This course provides extensive hand-on exercises. This course prepares students to take the Cisco Voice Over IP (CVOICE) certification exam (642-436). Prerequisite: CSCO-292 or CCENT certification. (2 hours lecture, 3 hours lab weekly)

CSCO-308 CCNA Security

3 credits

This course concentrates on in-depth, theoretical understanding of network security principles as well as the tools and configuration available. This course emphasizes the practical application of skills needed to design, implement, and support network security. This course prepares students to take the Implementing Cisco IOS Network Security (IINS) certification exam (640-543). Prerequisite: CSCO-292 or CCENT certification. (2 hours lecture, 3 hours lab weekly)

CSCO-652 Implementing IP Switching

3 credits

This course teaches students how to implement, monitor, and maintain switching in converged enterprise campus networks. Students will learn how to plan, configure, and verify the implementation of complex enterprise switching solutions. The course also covers the secure integration of VLANs, WLANs, voice, and video into campus networks. Comprehensive labs emphasize hands-on and practice to reinforce configuration skills. This course prepares students to take the Implementing Cisco IP Switched Networks (SWITCH) 642-813 certification exam. Prerequisite: CSCO-294 or CCNA certification. (2 hours lecture, 3 hours lab weekly)

ELEC-140 Network Cabling Systems

3 credits

This course is designed to train individuals in the fundamentals of installing, connecting and certifying network cabling systems. Students will learn to apply the basics of network cable and connector selection, installation and termination. Fundamental testing, certification, and documentation practices will be covered. Labs include hands-on experience with terminating and testing coaxial, unshielded twisted pair (UTP), and fiber optic cables in accordance with current industry and EIA/TIA standards. (2 hours lecture, 3 hours lab weekly)

MSFT-251 Windows Client Configuration

3 credits

The purpose of this course is to prepare students to support end users who run Microsoft Windows client operating systems in a corporate environment. Students will gain experience using applications that are included with the operating system, such as productivity applications used in a corporate environment and Microsoft Office applications. This course provides in-depth, hands-on training for IT professionals responsible for the implementation and management of Microsoft's client operating system. Prerequisite: CMSY-158. (2 hours lecture, 2 hours lab weekly)

MSFT-252 Windows Server Administration

3 credits

This course will provide students with the knowledge, skills, and abilities to fulfill server administrator responsibilities. Students will learn to perform the day-to-day management of an infrastructure of Windows servers for an enterprise organization. Management topics include managing the server operating system, file, and directory services; software distribution and updates; profiling and monitoring assigned servers; and troubleshooting. Additionally, this course may help prepare students for a Microsoft Certification exam. Please see the Microsoft website to verify the most current requirements. Prerequisite: CMSY-158. (2 hours lecture, 2 hours lab weekly)

MSFT-253 Active Directory Configuration

3 credits

This course provides the knowledge directory administrators need to manage infrastructure, Web, and IT application servers. It provides in-depth, hands-on training for information technology (IT) professionals responsible for: managing the server operating system, file, and directory services; managing domain name services, objects, and policies; and maintaining the directory environment. Additionally, this course may help prepare students for a Microsoft Certification exam. Please see the Microsoft website to verify the most current requirements. Prerequisite: CMSY-158. (2 hours lecture, 2 hours lab weekly)

VMCP-101 Introduction to Virtualization

3 credits

This course provides students with a basic understanding of virtual infrastructures and why government and private businesses are transforming traditional infrastructures into virtual environments. Corequisite: VMCP-102. (2 hours lecture, 2 hours lab weekly)

VMCP-102 Virtualization of Computers, Networks, and Storage

3 credits

This course provides students with a basic understanding of physical computers, network devices, and storage media that are converted to virtual devices and placed in a virtual environment. Topics include physical, virtual, and logical topologies, and relationships between the virtual architectural elements and the physical world. Corequisite: VMCP-101. (2 hours lecture, 2 hours lab weekly)

VMCP-103 Installation Configuration and Management of ESXi and vSphere

3 credits

This course will prepare students interested in working in the virtual information technology area using VMware ESXi, vSphere, and Workstation. Students will gain experience working with VMware technology, including ESXi, the industry-leading, purpose-built bare-metal hypervisor, vSphere, the leading virtualization platform with consistent management of computer resources, and Workstation, a leading non bare-metal hypervisor. Completion of this course satisfies the

prerequisite to sit for the VMware Certified Professional – Data Center Virtualization (VCP-DCV) exam. Prerequisite: VMCP-102. (2 hours lecture, 2 hours lab weekly)

VMCP-104 Software-Defined Data Center

3 credits

This course prepares students to lead VMware NSX™ design and deployment projects by providing them with understanding of general design processes and frameworks. Students look at the design and deployment considerations for network virtualization as part of an overall software-defined data center design. Prerequisite: VMCP-103. (2 hours lecture, 2 hours lab weekly)

VMCP-105 Network and Security

3 credits

This course prepares students to administer a vSphere infrastructure for an organization of any size and forms the foundation for other VMware technologies. Students will gain advanced skills for configuring and maintaining a highly available and scalable VMware virtual infrastructure. Prerequisite: VMCP-103. (2 hours lecture, 2 hours lab weekly)

VMCP-106 Desktop and Mobility

3 credits

This course prepares students to deliver virtual desktops and applications through a single virtual infrastructure. Prerequisite: VMCP-103. (2 hours lecture, 2 hours lab weekly)

MINI-PROFILE OF HCC FALL CREDIT ENROLLMENT STATISTICS
CREDIT HEADCOUNT: 9,935
FTE CREDIT ENROLLMENT (MD STUDENTS): 2842.03

FALL 2015

BY STATUS			
	FT	PT	TOTAL
Day	3,506	4,732	8,238
Evening	153	1,544	1,697
Total	3,659	6,276	9,935
%	37%	63%	100%

BY GENDER			
	FT	PT	TOTAL
Male	1,869	2,418	4,287
Female	1,790	3,858	5,648
Total	3,659	6,276	9,935

BY MEDIAN AGE			
	FT	PT	TOTAL
Male	19	22	20
Female	19	26	23
All students	19	24	22

AVERAGE CREDIT HOUR LOAD		
	FT	PT
Full-time		13.4
Part-time		6.2
All Students		8.9

PELL GRANT RECIPIENTS

Full-time	1268	35%
Part-time	1309	21%
All Students	2577	26%

* FTE does not include HCC employees.
 Note: Percentages do not always add to 100 due to rounding.
 EMS

BY REGISTRATION STATUS		
New: First-Time	1,849	19%
New: Transfer	799	8%
Returning	7,047	71%
Concurrent/Dual Enrolled	240	2%
First-Time, Full-Time	1,174	12%

BY RESIDENCE		
Howard County	7,389	74%
Other Md.	2,331	23%
Out-of-State	192	2%
Unknown	23	0.2%

BY RACIAL/ETHNIC GROUP		
American Indian/Alaskan Native	24	0.2%
Asian	1,303	13%
Black/African American	2,872	29%
Hispanic/Latino (of any race)	1,079	11%
Native Hawaiian/Other Pacific Islander	28	0.3%
White	3,916	39%
2 or More Races	440	4%
Unknown	273	3%

BY PROGRAM AND STATUS	FT	PT	TOTAL
TRANSFER PROGRAMS			
Accounting	62	145	207
Arts & Sciences	1,206	1,567	2,773
Business Administration	230	200	430
Computer Science	155	155	310
Engineering	206	179	385
Entrepreneurship	15	21	36
General Studies	856	1,245	2,101
Information Technology	80	110	190
Nursing/LPN Pathway**	232	970	1,202
Teacher Education	183	276	459
Sub-Total Transfer	3,225	4,868	8,093

BY PROGRAM AND STATUS	FT	PT	TOTAL
OCCUPATIONAL PROGRAMS			
Architectural & Construction Mgt.	10	22	32
Bio. Med. Eng. Tech.	17	28	45
Business Management	89	121	210
CAD Technology	8	19	27
Cardiovascular Technology	7	12	19
Certified Bookkeeping	-	14	14
Culinary Management	47	64	111
CompTech/Comp Supp Tech	7	37	44
Computer Forensics	-	7	7
Construction Management	2	5	7
Dental Hygiene	45	96	141
Diagnostic Medical Sonography	13	100	113
Early Childhood Develop	12	74	86
Electronics Technology	4	11	15
EMT/Paramedic	26	48	74
Entrepreneurship AAS	4	1	5
Event Management	1	5	6
Fire Science & Leadership AAS	1	1	2
Graphic Design Certificate	-	1	1
Health Care for the Professional	3	17	20
Hospitality Management	22	35	57
Human Services	1	3	4
Licensed Practical Nursing	8	63	71
Medical Lab Technician	6	29	35
Network Administration	9	53	62
Office Technology	3	29	32
Personal Training Certificate	-	1	1
Police Science	-	1	1
Physical Therapist Assistant	41	69	110
Radiologic Tech AAS	21	124	145
Web Dev./Master/Internet Professional	1	13	14
Programs with other CC*	2	2	4
NCU Programs	-	1	1
Sub-Total Occupational	410	1,106	1,516
UNDECLARED MAJOR	24	302	326
TOTAL	3,659	6,276	9,935

* Previously included with the undeclared major.

**Including Paramedic to RN and Military to RN Pathway sequence

REVISED - 1/12/16

MINI-PROFILE OF HCC SPRING CREDIT ENROLLMENT STATISTICS
CREDIT HEADCOUNT: 9,189
FTE CREDIT ENROLLMENT (MD STUDENTS): 2510.80

SPRING 2016

BY STATUS				BY REGISTRATION STATUS			BY PROGRAM AND STATUS			FT	PT	TOTAL
	FT	PT	TOTAL	New: First-Time	437	5%	TRANSFER PROGRAMS					
Day	2,814	4,822	7,636	New: Transfer	600	7%	Accounting	56	114	170		
Evening	122	1,431	1,553	Returning	7,417	81%	Arts & Sciences	877	1,387	2,264		
Total	2,936	6,253	9,189	Readmitted	302	3.29%	Business Administration	214	189	403		
%	32%	68%	100%	Concurrently Enrolled	433	5%	Computer Science	168	185	353		
							Engineering	162	157	319		
							Entrepreneurship	8	21	29		
				<i>First-Time, Full-Time</i>	159	2%	General Studies	700	1,294	1,994		
							Nursing/LPN Pathway	192	960	1,152		
							Teacher Education	146	272	418		
							Sub-Total Transfer	2,523	4,579	7,102		
BY GENDER				BY RESIDENCE			OCCUPATIONAL PROGRAMS					
	FT	PT	TOTAL	Howard County	6,871	75%	Architectural & Construction Management	18	30	48		
Male	1,513	2,373	3,886	Other Md.	2,066	22%	Bio. Med. Eng. Tech.	8	45	53		
Female	1,422	3,873	5,295	Out-of-State	174	2%	Business Management	60	116	176		
Unknown	1	7	8	Unknown	78	1%	CAD Technology	11	26	37		
Total	3,122	6,275	9,181				Cardiovascular Technology	3	35	38		
							Certified Bookkeeping	2	13	15		
							CompTech/Comp Supp Tech	6	29	35		
							Culinary Management	30	51	81		
BY MEDIAN AGE				BY RACIAL/ETHNIC GROUP			Dental Hygiene	36	111	147		
	FT	PT	TOTAL	American Indian/Native Alaskan	19	0.2%	Diagnostic Medical Sonography	16	113	129		
Male	20	22	21	Asian	1,229	13.4%	Early Childhood Develop	12	79	91		
Female	20	26	23	Black/African American	2,656	28.9%	Electronics Technology	3	9	12		
All students	20	24	22	Hispanic/Latino (of any race)	985	10.7%	EMT/Paramedic	23	40	63		
				Native Hawaiian/Other Pacific Islander	26	0.3%	Entrepreneurship AAS	-	6	6		
				White	3,580	39.0%	Event Management	5	6	11		
				2 or More Races	397	4.3%	Fire Science and Leadership	1	5	6		
				Unknown	297	3.2%	Graphic Design/Gaming/Multimedia	-	1	1		
							Health Care for the Professional	1	24	25		
							Hospitality Management	22	30	52		
							Information Technology	68	116	184		
							Licensed Practical Nursing	4	76	80		
							Medical Lab Tech	7	33	40		
							Network Administration	3	36	39		
							Office Technology	6	31	37		
							Personal Training Certificate	-	1	1		
							Police Science	-	1	1		
							Physical Therapist Asst.	17	85	102		
							Radiologic Tech Program	15	117	132		
							Web Dev./Master/Internet Professional	-	13	13		
							Programs with other CC*	2	14	16		
							NCU Programs	-	-	-		
							Sub-Total Occupational	379	1,292	1,671		
							UNDECLARED MAJOR	34	382	416		
							TOTAL	2,936	6,253	9,189		

* FTE does not include HCC employees.
 Note: Percentages do not always add to 100 due to rounding.
 EMS

* Previously included with the undeclared major.