

# Hagerstown Community College

## Information Systems Technology

### Programs

Getting started in Information Systems Technology ..... 2

#### ***Degree Program***

Information Systems Technology (IST) Degree

IST: Option in Computer Forensics..... 4

IST: Option in Computer Support Specialist ..... 6

IST: Option in Developer ..... 9

IST: Option in Networking Technology ..... 11

IST: Option in Simulation and Digital Entertainment..... 15

#### ***Other Program Options***

Computer Support Specialist Certificate..... 8

Networking Technology Certificate ..... 13

Computer Science Transfer ..... 17

Industry Certifications ..... 20



## **WHY SHOULD I TAKE AN INTRODUCTION TO INFORMATION SYSTEMS COURSE AT HCC?**

The world of computers and technology is constantly changing and evolving along with the opportunities for new and exciting jobs. The Information Systems Technology (IST) area offer several challenging and rewarding programs that will lead to new careers that range from computer gaming, computer science, developer (formerly programmer), support technician, security, forensics, and networking. In accordance with the Microsoft Academic Alliance Agreement, students are supplied with the current software that is used by industry at a free or nominal cost. By supplying the students with hands-on instruction, small classes, knowledgeable instructors, and a friendly learning environment, HCC offers superior learning that will lead to student success in terms of employment. In addition, HCC's tuition is affordable.

## **WHERE DO I START?**

The prerequisite for most IST courses is IST 102—Introduction to Information Technology. This course provides students with an overview of what is available in the program options listed above. Students will also gain hands-on experience in software that they can apply in other required courses. After completing this course, students are ready to tackle advanced courses in their career path.

## **WHERE DO I GO FROM HERE?**

A good starting point would be to contact a program coordinator about the area in which you're interested. They will help you map out a semester-by-semester plan that will allow you to complete your certificate or degree in the shortest amount of time possible. The program coordinators are knowledgeable about national certifications that can be used in place of credit courses. Contact information is available at the end of each program description in this booklet. It's recommended that you contact a program coordinator or an academic advisor prior to starting at HCC.

## **BUILDING YOUR EDUCATION ONE STEP AT A TIME**

Some programs offer a Letter of Recognition (LOR), which can be applied to a certificate or degree. The purpose behind LORs is to allow students to sample courses that are specific to a program. Students should not consider LORs to be the same as a certificate. LORs and certificates are a means of building courses that will lead to a degree. In addition, an A.S. degree (in the programs described within) is transferrable to a four-year institution. Some career paths require a four-year degree in order to obtain employment.

## A.A.S. Degree

# Information Systems Technology

The Information Systems Technology Program is designed to give students the opportunity to choose the area of technology most appealing to them. Students earn the A.A.S. degree in information systems technology by specializing in a concentration. This curriculum is for students interested in the following: computer forensics, computer support, developer, networking technology, and simulation and digital entertainment. Students who select one of these concentrations and wish to transfer to a four-year institution, or who are interested in computer science, should consult an academic advisor. Completion of the information systems technology degree must be within four years of the current college catalog due to constantly changing technology. Students who do not complete their degree requirements within four years will fall under the latest catalog. Courses with (CW 150) in the title are HCC courses that have been aligned with the Cyberwatch curriculum.

## General Education Requirements\*

21-23 Credits

### Arts/Humanities

Select from approved General Education course list ..... 3

### Behavioral/Social Sciences

Select from approved General Education course list ..... 3

### Biological/Physical Science

Select from approved General Education course list ..... 3-4

### English

ENG 101 English Composition ..... 3

ENG 102 Composition and Literature ..... 3

OR

ENG 112 Technical Writing I ..... (3)

### Information Literacy

IST 102 Introduction to Information Technology (CW 120)..... 3

### Mathematics

MAT 101 or another MAT course from approved list..... 3-4

*\*Please note Computer Forensics concentration requires specific General Education requirements*

## Program Requirements

Choose one of the five concentrations:

1. Computer Forensics (pages 4-5)
2. Computer Support Specialist (pages 6-8)
3. Developer (pages 9-10)
4. Networking Technology (pages 11-14)
5. Simulation and Digital Entertainment (pages 15-16)

### WHAT IS COMPUTER FORENSICS?

Computer forensics is the process of acquiring, examining, and reporting of digital evidence within the legal system. It incorporates the methodical examination of computer media as well as network components, software, and memory for evidence. Computer forensics is also referred to as system forensics, digital forensics, computer forensics analysis, electronic discovery, data recovery, and computer analysis.

### WHAT DO COMPUTER FORENSICS TECHNICIANS DO?

A computer forensics technician looks for evidence on hard disks, tapes, compact disks, flash drives, and other media. A skilled forensics specialist should be able to conduct a thorough analysis to reconstruct a user's activities on a single device or across a network or the Internet and often uses evidence to reconstruct past events or activities. Forensics specialists use evidence to gain a better understanding of crimes through the handling of digital data, and are able to show use or abuse of information technology hardware, software, and services and to prove policy violations or illegal activity.

### WHAT IS THE EMPLOYMENT OUTLOOK FOR THIS CAREER?

Investigators held about 45,500 jobs in 2008. Around 41 percent of investigator jobs were in investigation and security services. The rest worked mostly in state and local government, legal services firms, and insurance agencies.

Employment of investigators is expected to grow 22 percent over the 2008 to 2018 decade, much faster than the average for all occupations. Increased demand will result from heightened security concerns, increased litigation, and the need to protect confidential information and property of all kinds. The proliferation of criminal activity on the Internet, such as identity theft, spamming, email harassment, and the illegal downloading of copyrighted materials, will also increase demand (source: [www.bls.gov/oco](http://www.bls.gov/oco)).

### WHAT ARE THE AVERAGE EARNINGS?

Median annual wages of salaried investigators were \$41,760 in May 2008. The middle 50 percent earned between \$30,870 and \$59,060. Wages of investigators vary greatly by employer, specialty, and geographic location (source: [www.bls.gov/oco](http://www.bls.gov/oco)).

### WHY SHOULD I CHOOSE HCC?

The computer forensics concentration is designed to provide an introduction to the forensic investigation aspect of computers and related electronic data systems. The program includes an overview of forensic evidence collection methods, investigative techniques, and procedures suitable for persons exploring the computer forensics field as a career option. Those students interested in pursuing a career in a highly-specialized field can transfer credits to four-year colleges offering degree programs in computer forensics. Students can also use the computer forensics option as a second degree to enhance career advancement.

### HOW DO I GET MORE INFORMATION?

Contact:  
Steve Shank  
Professor, Information Systems Technology  
240-500-2536  
[sps Shank@hagerstowncc.edu](mailto:sps Shank@hagerstowncc.edu)

**Concentration I:****Computer Forensics**

The computer forensics concentration is designed to provide an introduction to the forensic investigation aspect of computers and related electronic data systems. The program includes an overview of forensic evidence collection methods, investigative techniques, and procedures suitable for persons exploring the computer forensics field as a career option or who need training for promotion.

**General Education Requirements****21-23 Credits***(see page 3)***\*Specific Behavioral/Social Sciences General Education Requirement**

SOC	101	Introduction to Sociology .....	3
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**Program Requirements****38 Credits**

ADJ	101	Introduction to Criminal Justice.....	3
ADJ	203	Criminal Law .....	3
ADJ	204	Criminal Investigation .....	3
ADJ	205	Criminalistics .....	4
IST	101	Basic Keyboarding.....	1
IST	108	Microsoft Operating System (CW 130).....	3
IST	150	PC Tech—Repair and Troubleshooting.....	3
IST	151	PC Tech—Operating Systems .....	3
IST	154	Networking Basics.....	3
IST	166	Computer Forensics I—Principles and Practices .....	3
IST	266	Computer Forensics II—Investigations Practices .....	3
IST	269	Internship I.....	3
SOC	103	Criminology .....	3

**Electives****9 Credits**

Approved courses are listed below. Electives should be selected in consultation with the Technology and Computer Studies Division to satisfy career goals and/or transfer college requirements.

BTC	101	Introduction to Biotechnology.....	3
IST	109	UNIX/Linux Operating System (CW 140) .....	3
IST	160	Introduction to Security Fundamentals (CW 160).....	3
IST	260	MCSA/E Windows Professional.....	3
IST	261	Server Management I.....	3
IST	267	Network Security (CW 215) .....	3
STU	106	Professionalism in the Workplace.....	1

**Degree Requirement.....68**

*This degree must be completed within four years because of constantly changing technology. Students who do not complete within four years will fall under the latest college catalog.*

### WHAT IS THE COMPUTER SUPPORT SPECIALIST PROGRAM?

The computer support specialist degree provides students with the skills to build, troubleshoot, and repair microcomputer systems; install operating systems; diagnose and troubleshoot faulty operating systems; install, use and assist others with software applications; set-up small networks; write script and batch files; and provide end-user support.

Through the course of the program, students develop troubleshooting and problem-solving skills, customer service skills, and critical thinking skills. Students gain experience through simulation, labs, and interaction in real-world computer repair clinics. Curriculum prepares students for the following certifications:

- IC3
- CompTIA A+, Network+
- MOS
- MCAS
- Microsoft Certified Professional (MCP) or Cisco Certified Network Associate (CCNA)

\*dependent upon electives taken

### WHAT IS THE EMPLOYMENT OUTLOOK FOR THIS CAREER?

Employment of computer support specialists expected to increase by 14 percent from 2008 to 2018, faster than the average for all occupations (source: [www.bls.gov/oco](http://www.bls.gov/oco)).

### WHAT ARE THE AVERAGE EARNINGS FOR THIS CAREER?

Earnings will vary by location, education, and experience. Median annual wages of wage-and-salary computer support specialists were \$43,450 in May 2008. The middle 50 percent earned between \$33,680 and \$55,990. The lowest 10 percent earned less than \$26,580, and the highest 10 percent earned more than \$70,750 (source: [www.bls.gov/oco](http://www.bls.gov/oco)).

### WHY SHOULD I CHOOSE HCC?

- Students are provided with hands-on learning experiences: building and repairing systems; troubleshooting computers brought in from the local community and current student population; and setting up networks
- Other courses offer job shadowing help desks and IT departments and team projects in real working environments
- Local internships with both small and large companies
- Opportunity to join the ITA (Information Technology Association); monthly meetings; field trips; and computer CPR clinics

### HOW DO I GET MORE INFORMATION?

Contact:

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**Concentration 2:**
**Computer Support Specialist**

The computer support specialist concentration provides students with the skills necessary for a career in the computer support field. Courses will concentrate on current packages for word processing, spreadsheets, database management, Internet access, presentation, and Web publishing. Two different operating systems will also be covered. Classes are conducted in hands-on labs. Upon completion of the program, the student will be prepared for MCSA, A+, and Net+ certification exams. Students are required to keyboard 25 words a minute for two minutes with two errors or less before enrolling in IST courses beyond IST 102. A keyboarding proficiency examination is available for those who wish to test out of this requirement.

**General Education Requirements**
**21-23 Credits**
*(see page 3)*
**Program Requirements**
**39 Credits**

BUS	145	Customer Service.....	1
IST	101	Basic Keyboarding.....	1
IST	103	Presentation Software .....	1
IST	105	Fundamentals of Word Processing .....	3
IST	106	Spreadsheet Software.....	3
IST	107	Database Management .....	3
IST	108	Microsoft Operating System (CW 130).....	3
IST	109	UNIX/Linux Operating System (CW 140) .....	3
IST	150	PC Tech: Repair and Troubleshooting.....	3
IST	151	PC Tech: Operating Systems .....	3
IST	154	Networking Basics.....	3
IST	203	Troubleshooting Software Applications .....	3
IST	204	Help Desk Technology and Services.....	3
IST	269	Internship I.....	3
WEB	101	Web Design I .....	3

**Electives**
**7-9 Credits**

Approved courses are listed below. Electives should be selected in consultation with the Technology and Computer Studies Division to satisfy career goals and/or transfer college requirements.

IST	155	Networking I (CW 150) .....	(4)
IST	156	Networking II (CW 151) .....	(4)
IST	160	Introduction to Security Fundamentals (CW 160).....	(3)
IST	166	Computer Forensics I—Principles and Practices .....	(3)
IST	253	TCP/IP .....	(3)
IST	260	MCSA/E: Windows Professional.....	(2)
IST	261	Server Management I (CW 230).....	(3)
IST	262	MCSA/E: Windows Network Infrastructure .....	(2)
IST	264	Server Management II.....	(3)
IST	266	Computer Forensics II—Investigations Practices .....	(3)
IST	267	Network Security (CW 215) .....	(3)
STU	106	Professionalism in the Workplace.....	(1)

**Degree Requirement.....6**

*Learn about the certificate option on page 8.*

**Certificate****Computer Support Specialist**

This program provides students with the skills necessary for a career in the computer support field. Courses will concentrate on current packages for word processing, spreadsheets, database management, Internet access, presentation, and Web publishing. Two different operating systems will also be covered. Classes are conducted in hands-on labs. Upon completion of the program, students will be prepared for MOS, A+, and Net+ certification exams.

**Program Requirements****39 Credits**

BUS	145	Customer Service.....	1
IST	101	Basic Keyboarding.....	1
IST	102	Introduction to Information Technology (CW 120).....	3
IST	103	Presentation Software .....	1
IST	105	Fundamentals of Word Processing .....	3
IST	106	Spreadsheet Software.....	3
IST	107	Database Management .....	3
IST	108	Microsoft Operating System.....	3
IST	109	UNIX/Linux Operating System (CW 140) .....	3
IST	150	PC Tech: Repair and Troubleshooting.....	3
IST	151	PC Tech: Operating Systems .....	3
IST	154	Networking Basics.....	3
IST	203	Troubleshooting Software Applications .....	3
IST	204	Help Desk Technology and Services .....	3
WEB	101	Web Design I .....	3

**Certificate Requirement .....39**



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## **WHAT IS A DEVELOPER?**

There are two terms that are frequently used to describe the people who work in the computer field: those who write code (programmers) and those who are involved in the software creation process (developers/engineers). Several years ago, HCC only trained programmers, but now prospective candidates and graduates are involved in all facets of the software development cycle. This includes, but is not limited to, software design, implementation, installation, configuration, customization, integration, data migration, feasibility and cost benefit analysis, documentation, prototyping, and testing.

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## **WHAT IS THE EMPLOYMENT OUTLOOK FOR THIS CAREER?**

Computer software developers/engineers are among some of the occupations projected to grow the fastest and add the most new jobs over the 2008 to 2018 decade, resulting in excellent job prospects (an increase of 20 percent or more). At the same time, employment of computer programmers is expected to decline by 3 percent through 2018. Job prospects will be best for applicants with a bachelor's or higher degree and relevant experience.

Employment opportunities will vary by location. Most jobs will be located around major metropolitan cities or their surrounding areas, such as the DC/Metro area. According to the National Bureau of Labor and Statistics, it is estimated that:

- 514,800 people will be employed as computer applications software developers or engineers
- 394,800 people will be employed computer systems software developers or engineers
- 426,700 people will be employed as computer programmers
- 48,200 people will be self-employed computer software developers, engineers, and computer programmers

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## **WHAT DO DEVELOPERS EARN?**

Starting salaries will vary based on education, location and experience. According to the National Bureau of Labor and Statistics, a computer programmer can expect an average wage of \$35.91 per hour with an annual wage of \$70,940 to \$91,000. Developers/engineers can expect an average wage of \$43.35 per hour with an annual wage between \$54,840 to \$132,080 (source: [www.bls.gov/oco](http://www.bls.gov/oco)).

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## **WHY SHOULD I CHOOSE HCC?**

HCC offers smaller classes, which allows instructors to get to know students on a personal level. HCC also offers an internship program, which has led to students finding employment locally. In addition, employers contact the college for hiring recommendations. In the near future, HCC will not only offer an A.A.S. degree in developer, but will also offer an A.S. transfer program to local, four-year colleges.

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## **HOW DO I GET MORE INFORMATION?**

Contact:

Trudy Gift

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240-500-2214

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## Concentration 3: Developer

The developer concentration is for the student interested in a career in computer programming. Major areas of study include programming languages, documentation, structured design principles, problem-solving, systems analysis and design, and business ethics. Classes are conducted in hands-on computer labs. Students are required to keyboard 20 words a minute for two minutes with two errors or less before enrolling in IST courses beyond IST 102. A keyboarding proficiency examination is available for those who wish to test out of this requirement.

### General Education Requirements

**21-23 Credits**
*(see page 3)*

### Program Requirements 40 Credits

BUS	101	Introduction to Business Organization and Management.....	3
IST	101	Basic Keyboarding.....	1
IST	108	Microsoft Operating System (CW 130).....	3
IST	109	UNIX/Linux Operating System (CW 140) .....	3
IST	132	Introduction to C and C++ Programming.....	3
IST	133	Visual Basic .....	3
IST	134	Introduction to JAVA Programming.....	3
IST	173	Database Fundamentals.....	3
IST	202	Systems Design and Analysis .....	3
IST	269	Internship I.....	3
SDE	130	Introduction to Object Oriented Programming .....	3
WEB	101	Web Design I .....	3
WEB	115	Web Developer I .....	3
WEB	210	Web Developer II .....	3

### Electives 5-7 Credits

Approved courses are listed below. Electives should be selected in consultation with the Technology and Computer Studies Division to satisfy career goals and/or transfer college requirements.

ACC	101	Principles of Accounting I .....	(3)
ACC	102	Principles of Accounting II .....	(3)
BUS	145	Customer Service.....	(1)
GDT	112	Computer Graphics.....	(3)
IST	103	Presentation Software .....	(1)
IST	105	Fundamentals of Word Processing .....	(3)
IST	106	Spreadsheet Software.....	(3)
IST	107	Database Management .....	(3)
IST	150	PC Tech: Repair and Troubleshooting.....	(3)
IST	151	PC Tech: Operating Systems .....	(3)
IST	154	Networking Basics.....	(3)
IST	232	Advanced C++ Programming.....	(3)
SDE	102	Multimedia Authoring.....	(3)
STU	106	Professionalism in the Workplace.....	(1)

**Degree Requirement.....68**

### WHAT IS NETWORKING TECHNOLOGY?

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This program of study provides students with the knowledge needed to prepare for entry-level security positions and also serves as a refresher program for those already working in the field who wish to update their skills. This program emphasizes computer security and information assurance concepts augmented with current industry standard techniques. Topics include threats and vulnerabilities, prevention at the technical and human levels (hardware and software), detection, response, and management aspects of security. Upon program completion, students will be prepared for entry-level positions in security or to transfer to a four-year institution to complete a bachelor's degree in information assurance or a related field.

Students earning this associate's degree are prepared to enter these jobs:

- Security specialist
- Information assurance specialist
- Information systems security specialist
- Network security specialist
- Applications security specialist
- Operating system security specialist

### WHAT IS THE EMPLOYMENT OUTLOOK?

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Employment of network and computer systems administrators is expected to increase by 23 percent from 2008 to 2018, which is much faster than the average for all occupations. These occupations will add 220,000 new jobs over that period. Computer networks are an integral part of business, and demand for these workers will increase as firms continue to invest in new technologies. The increasing adoption of mobile technologies will encourage more establishments to use the Internet to conduct business online. Growth will also be driven by the increasing need for information security. As cyber attacks become more sophisticated, demand will increase for workers with security skills (source: [www.bls.gov/oco](http://www.bls.gov/oco)).

### WHAT ARE THE AVERAGE EARNINGS?

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According to the Bureau of Labor Statistics, median annual wages of network and computer systems administrators were \$66,310 in May 2008. The middle 50 percent earned between \$51,690 and \$84,110. The lowest 10 percent earned less than \$41,000 and the highest 10 percent earned more than \$104,070. Wages will vary depending on location, level of experience, and education (source: [www.bls.gov/oco](http://www.bls.gov/oco)).

### WHY SHOULD I CHOOSE HCC?

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HCC is a proud member of Cyberwatch, a consortium of community colleges, four-year colleges and universities and public and private partners (see page 14).

HCC has aligned many of its networking technology courses with approved Cyberwatch curriculum. This alignment assures that students receive quality information security education that is recognized throughout the state of Maryland and the Washington, DC-metropolitan area.

Graduates of HCC'S program are encouraged to seek post-community college education at an institution designated as a National Center of Academic Excellence in Information Assurance Education (CAEIAE). Learn more on page 14.

### HOW DO I GET MORE INFORMATION?

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Contact:

Steve Shank

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240-500-2536

[spshank@hagerstowncc.edu](mailto:spshank@hagerstowncc.edu)

**Concentration 4:**
**Networking Technology**

The networking technology concentration is for the student interested in a career in networking concepts. Major areas of study include network fundamentals, design, management, troubleshooting, and operating systems. Two options are offered: network administrator and network security. Classes are conducted in hands-on computer labs. This program of study embraces the body of knowledge found in the following computer industry certifications: A+, Net+, Security+, Cisco, and Microsoft Certified Technology Specialist (MCTS) and Microsoft Certified IT Professional (MC ITP) Certification. Students are required to keyboard 20 words a minute for two minutes with two errors or less before enrolling in IST courses beyond IST 102. A keyboarding proficiency examination is available for those who wish to test out of this requirement.

**General Education Requirements**
**21-23 Credits**
*(see page 3)*
**Program Requirements**
**36 Credits**

IST	101	Basic Keyboarding.....	1
IST	108	Microsoft Operating System (CW 130).....	3
IST	109	UNIX/Linux Operating System (CW 140) .....	3
IST	140	Fundamentals of Wireless Computing (CW 245).....	3
IST	150	PC Tech: Repair and Troubleshooting.....	3
IST	151	PC Tech: Operating Systems .....	3
IST	154	Networking Basics.....	3
IST	155	Networking I (CW 150) .....	4
IST	156	Networking II (CW 151) .....	4
IST	260	MCSA/E: Windows Professional.....	3
IST	261	Server Management I (CW 230).....	3
IST	269	Internship I (CW 269).....	3

**Choose one of the following options (12 credits) to complete this degree:**
**Option A: Network Administrator**

IST	255	Networking III (CW 250) .....	4
IST	256	Networking IV (CW 251) .....	4
IST	264	Server Management II.....	3

**Option B: Network Security**

(Mapping is pending to NSTISSI-4011, National Standard for Information Systems Security [INFOSEC] Professionals.) The option Network Security mapping is pending to NSTISSI-4011, National Training Standard for Information Systems Security [INFOSEC] Professionals.

IST	160	Introduction to Security Fundamentals (CW 160).....	3
IST	253	TCP/IP .....	3
IST	254	Network Design and Defense.....	3
IST	267	Network Security (CW 215) .....	3

**Degree Requirement.....69**
*Learn about the certificate option on page 13.*

Certificate

# Networking Technology

This program is for the student interested in a career in networking concepts. Major concentration will be network fundamentals, design and management, troubleshooting, and operating systems. Classes are conducted in hands-on labs. Currently, three national certifications are a part of this option: A+®, CISCO®, MCTS (Microsoft Certified Technology Specialist).

**Program Requirements** **37 Credits**

IST	101	Basic Keyboarding.....	1
IST	102	Introduction to Information Technology (CW 120).....	3
IST	150	PC Tech: Repair and Troubleshooting.....	3
IST	151	PC Tech: Operating Systems .....	3
IST	154	Networking Basics.....	3
IST	155	Networking I .....	4
IST	156	Networking II .....	4
IST	255	Networking III .....	4
IST	256	Networking IV.....	4
IST	260	MCSA/E: Windows Professional.....	3
IST	261	MCSA/E: Windows Server.....	3
IST	264	MCSA/E: Managing a Windows Network .....	3

**Electives** **7 Credits**

Approved courses are listed below.

ACC	101	Principles of Accounting I .....	(3)
ACC	102	Principles of Accounting II .....	(3)
IST	103	Presentation Software .....	(1)
IST	109	UNIX/Linux Operating System (CW 140) .....	(3)
IST	120	Web Publishing .....	(1)
IST	132	Introduction to C and C++ Programming.....	(3)
IST	166	Computer Forensics I.....	(3)
IST	173	Database Fundamentals.....	(3)
IST	202	Systems Design and Analysis .....	(3)
IST	262	MCSA/E: Windows Network Infrastructure .....	(2)
IST	263	MCSA/E: Windows Active Directory .....	(2)
IST	266	Computer Forensics II.....	(3)
IST	269	Internship I.....	(3)
STU	106	Professionalism in the Workplace.....	(1)

OR

BUS	145	Customer Service.....	(1)
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**Certificate Requirement** **38**

*This certificate must be completed within four years because of constantly changing technology. Students who do not complete within four years will fall under the latest college catalog.*



HCC is a partner in the Cyberwatch consortium. Cyberwatch provides assistance to its partner institutions for curriculum development and mapping of courses to the National Security Telecommunications and Information Systems Security (NS-TISSI) 4011 and 4013 standards. Curriculum development emphasizes building associate's degree programs from a set of core technical courses that, in addition to meeting 4011 and/or 4013 standards, help prepare students for several industry certifications including:

- CompTIA's A+, Network+, and Security+
- Cisco Certified Network Associate (CCNA)
- Certified Wireless Network Administrator (CWNA)
- Microsoft Certified Professional (MCP)
- Security Certified Network Professional (SCNP)

For more information, go to [www.cyberwatchcenter.org](http://www.cyberwatchcenter.org).

### Centers for Academic Excellence in Information Assurance

HCC was designated as a National Center of Academic Excellence in Information Assurance Two-Year Education (CAE2Y) by The National Security Agency and Department of Homeland Security in 2010. HCC was one of the first six community colleges to receive this distinction in the entire country. The CAE2Y program was established as a means of providing recognition to institutions that serve as models for two-year institutions by providing innovative, comprehensive and multidisciplinary education and training in the Information Assurance/Cybersecurity field. The goal of this program is to reduce vulnerability in the national information infrastructure by promoting higher education and research in information assurance (IA), as well as to produce a growing number of professionals with IA expertise in various disciplines.

Find out more at [www.nsa.gov/ia/academic\\_outreach/nat\\_cae/institutions.shtml](http://www.nsa.gov/ia/academic_outreach/nat_cae/institutions.shtml).

### WHAT IS SIMULATION AND DIGITAL ENTERTAINMENT?

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Simulation and digital entertainment (SDE) is an area of study where students can take real events and represent them in a virtual environment using computers and modern technologies. Students also learn to break down complex ideas into a visual medium where they can be viewed in an easy and understandable way.

Interactivity has become a large part of the SDE field. This includes the large and growing field of video games. Video game making has become a strong staple both in entertainment and in education, especially in Maryland. HCC's program enables students to take a concept and produce an image or an animation. Then, interactive components are taught to enhance the visual experience..

After completing this program, students can look forward to careers such as application, game and software development; software testing and quality assurance; software engineering; 2D and 3D animation; game, level and user interface design; or 3D, CG, environment, and concept art.

### WHAT IS THE EMPLOYMENT OUTLOOK FOR THIS CAREER?

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Employment in SDE is large and growing. In the Maryland/Washington D.C. area, over 80 game and simulation companies already exist, and that number is growing.

Maryland is the number one state on the east coast for game developers. Game development has grown so large that it now grosses more than the movie-making industry. Billions of dollars are being acquired by game and simulation companies annually. These dollars provide good salaries to people throughout Maryland.

### WHAT CAN I EXPECT TO EARN AS A GAME DEVELOPER?

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According to Game Developer Magazine, the median income salary for someone in the video game business in Maryland is \$75,000. For entry-level positions, employees can expect to earn between \$32,000 and \$55,000, depending on their field.

### WHY SHOULD I ATTEND HCC?

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HCC uses state-of-the-art computers and software to give students what they need in order to compete in a constantly changing environment.

HCC has multiple computer labs and software that includes Flash, 3DS Max, Game Engines, Compilers, Photoshop and Illustrator. With hands-on instruction, students can get the knowledge they need in a one-on-one environment, with insight from people who work directly in the field.

Successful educational institutions, combined with Web application and gaming companies, have worked with the SDE program in order to establish what they need in potential students and employees. HCC has ties with other colleges and universities to help students transfer to four-year institutions. Strong business relationships are being built to ensure students' success after college. Internships are also available.

### HOW DO I GET MORE INFORMATION?

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Contact:

David Maruszewski

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Program Coordinator, Simulation and Digital Entertainment

240-500-2361

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**Concentration 5:**
**Simulation and Digital Entertainment**

The simulation and digital entertainment (SDE) concentration provides students with the skills to design and develop computer games for fun, advertising, education, and simulations. Course concentration will be game design, programming, documentation, structured design principles, problem solving, and business ethics. Classes are conducted in hands-on labs.

**General Education Requirements**
**21-23 Credits**
*(see page 3)*
**Program Requirements**
**30 Credits**

GDT	112	Computer Graphics.....	3
GDT/ART	116	Digital Imaging .....	3
GDT	142	Computer Illustration: Adobe Illustrator .....	3
SDE	102	Multimedia Authoring.....	3
SDE	104	Game Programming I .....	3
SDE	130	Introduction to Object-Oriented Programming.....	3
SDE	201	Multimedia Algorithms .....	3
SDE	203	3D and Advanced Animation .....	3
SDE	205	Game Programming II.....	3
SDE	207	Multimedia Project Development .....	3

**Electives 15-16 Credits**

Electives should be selected in consultation with the Technology and Computer Studies Division to satisfy career goals and/or transfer college requirements. Select 15-16 elective credits from the following list.

ART	103	Drawing I.....	(3)
CAD	152	Computer-Aided Design I .....	(3)
ENG	114	Mythology.....	(3)
GDT	220	Digital Video and Audio .....	(3)
HIS	102	History of Civilization II .....	(3)
IST	132	Introduction to C and C++ Programming.....	(3)
IST	133	Visual Basic .....	(3)
MAT	102	Trigonometry .....	(3)
MAT	161	Precalculus.....	(3)
MAT	203	Calculus I .....	(3)
MAT	204	Calculus II .....	(3)
MAT	205	Calculus III .....	(3)
MUS	175	Introduction to Electronic Music .....	(3)
PHY	201	General Physics I.....	(4)
SDE	269	Internship I.....	(3)
SPD	103	Public Speaking .....	(3)
WEB	101	Web Design I .....	(3)
WEB	110	Web Design II .....	(3)
WEB	115	Web Developer I .....	(3)

**Degree Requirement.....66**



### WHAT IS A COMPUTER SCIENTIST?

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Computer scientists design and analyze algorithms to solve problems and develop and study the performance of computer hardware and software.

### WHAT IS THE COMPUTER SCIENCE TRANSFER PROGRAM?

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Computer science is a transfer program designed to prepare students for careers in software engineering and programming. It includes the study of computers, programming logic and languages, computational systems and mathematics. At HCC, this transfer program provides the first two years of courses needed to transfer to an upper division institution and complete a degree in computer science or computer engineering.

### WHAT IS THE EMPLOYMENT OUTLOOK FOR THIS CAREER?

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Computer software engineers and computer programmers held about 1.3 million jobs in 2008. About 32 percent were employed in computer systems design and related services. Many also worked for software publishers, computer manufacturers, financial institutions, insurance providers and educational institutions.

Employment of computer software engineers is expected to increase by 32 percent from 2008 to 2018. This area will see a large number of new jobs due to the demand in networking especially from the Internet, intranet and World Wide Web applications (source: [www.bls.gov/oco](http://www.bls.gov/oco)).

### WHAT ARE THE AVERAGE EARNINGS?

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In 2008, median annual wages were \$85,430 for computer applications engineers; \$92,430 for computer systems software engineers; and \$69,620 for computer programs. Earnings will vary based on education, location, type of job, and experience (source: [www.bls.gov/oco](http://www.bls.gov/oco)).

### WHAT ARE THE PROGRAM OPTIONS?

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HCC offers an associate of science (A.S.) degree in computer science. It provides the first two years of general education, mathematics, computer programming, and natural science. This serves as the first two years of study toward a baccalaureate degree in computer science or computer science with a minor in mathematics.

### WHY SHOULD I CHOOSE HCC?

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The curriculum provides graduates with a foundation in programming, algorithm development, mathematics, operating systems, and networks through a set of core courses.

By completing the first two years at HCC and the second two years at a four-year institution such as Shepherd University, students will have learned the fundamental principles and skills needed to become creative problem-solvers, develop and manage state-of-the-art computing systems, and have productive careers in computer science by applying their knowledge professionally in the computer industry, or to pursue graduate studies.

### HOW DO I GET MORE INFORMATION?

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Contact:

Steve Shank

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240-500-2536

[spshank@hagerstowncc.edu](mailto:spshank@hagerstowncc.edu)

**A.S. Degree****Computer Science**

Computer science is a program designed to prepare students for careers in software engineering. A major difference between computer science and information systems technology is the rigorous level of mathematics required for computer science. At many upper-division universities, like Towson University, a computer science major can earn a double major in mathematics. At HCC, this program provides the first two years of general education, mathematics, computer programming, and natural science needed to transfer to an upper-division institution and complete a computer science or computer engineering major. Electives should be selected to articulate with the specific institution and specific computer science program chosen.

**General Education Requirements****33-35 Credits****Arts/Humanities**

Select two courses in different disciplines from approved General Education course list ..... 6

**Behavioral/Social Sciences**

Select two courses in different disciplines from approved General Education course list.....6

**Biological/Physical Science**

PHY 203 Principles of Physics I..... 5

Select another Science course from approved General Education course list.....4-5

**English**

ENG 101 English Composition ..... 3

ENG 102 Composition and Literature ..... 3

**OR**

ENG 112 Technical Writing I ..... (3)

**Information Literacy**

IST 102 Introduction to Information Technology..... 3

**OR**

GDT 112 Computer Graphics.....(3)

**Mathematics**

MAT 101 College Algebra or another MAT course from approved list ..... 3-4

**Program Requirements****26-27 Credits**

CSC 132 Introduction to C and C++ Programming ..... 3

CSC 134 Introduction to Java Programming..... 3

CSC 232 Advanced C++ Programming ..... 3

MAT 204 Calculus II ..... 4

MAT 207 Discrete Mathematics..... 3

MAT 208 Linear Algebra ..... 4

**Select 6-7 credits from the following:****CSC/IST**

CSC 109 UNIX/Linux Operating System ..... 3

CSC 202 Systems Design and Analysis ..... 3

IST 107 Database Management ..... 3

SDE 104 Game Programming I ..... 3

**Mathematics**

MAT 161 Precalculus..... 4

MAT 203 Calculus I ..... 4

A.S. Degree  
Computer Science

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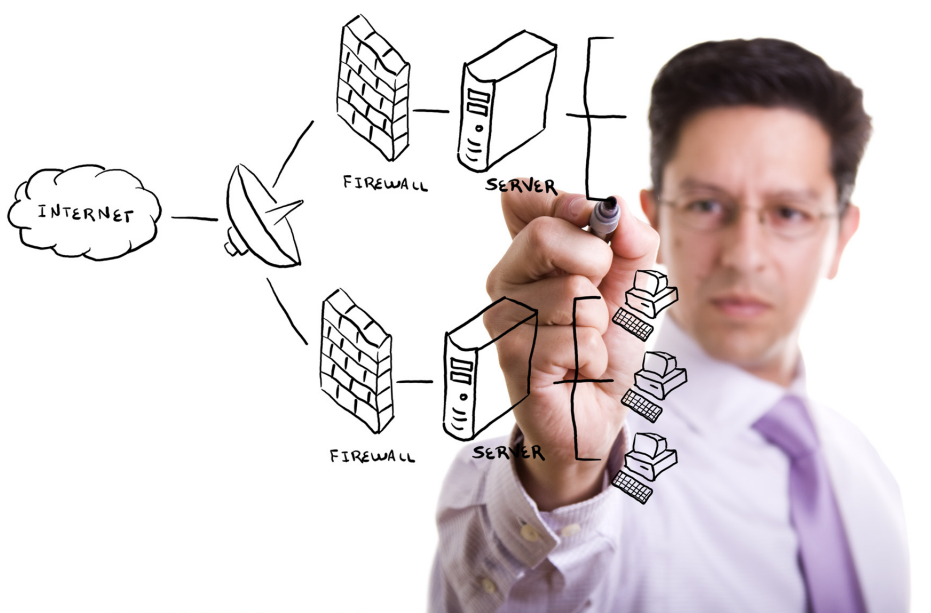
**Electives** **3-4 Credits**

Electives should be selected in consultation with a transfer advisor and the transfer institution.

Some recommended courses are listed below:

CHM	103	General Chemistry I .....	(4)
CSC	269	Internship I.....	(3)
IST	133	Visual Basic .....	(3)
IST	173	Database Fundamentals.....	(3)
PHY	204	Principles of Physics II.....	(5)
SDE	102	Multimedia Authoring.....	(3)
SDE	201	Multimedia Algorithms .....	(3)
SDE	203	3D and Advanced Animation.....	(3)
SDE	205	Game Programming II.....	(3)
SDE	207	Multimedia Project Development .....	(3)

**Degree Requirement** ..... **64**



IT INDUSTRY CERTIFICATION	ACRONYM	EXAM	RELATED HCC COURSE
Internet and Computer Core Certification	IC3	All three exams must be taken to earn certification 1. Computing Fundamentals 2. Key Applications 3. Living Online	IST 102
Microsoft Certified Application Specialist	MOS MOS MOS MOS	Using Microsoft Office PowerPoint 2010 Using Microsoft Office Word Expert 2010 Using Microsoft Office Excel Expert 2010 Using Microsoft Office Access 2010	IST 103 IST 105 IST 106 IST 107
CompTIA	Linux +	Linux + Exam	IST 109
Certified Wireless Network Administrator	CWNA	PWO-104	IST 140
CompTIA	A+ A+ Net+ Security +	CompTIA A+ Essentials* CompTIA A+ Practical Application* Network + Exam Security + Exam	IST 150 IST 151 IST 154 IST 160
Cisco Networking Academy: Cisco Certified Network Associate	CCNA	CCNA certification must be less than three years old.	IST 155 IST 156 IST 255 IST 256