Computer Programming

ACADEMIC SKILLS

AA SPEAKING AND LISTENING
AA1 Utilize effective verbal and non-verbal communication skills
AA2 Participate in conversation, discussion, and group presentations
AA3 Communicate and follow directions/procedures
AA4 Communicate effectively with customers and co-workers

AB READING AND WRITING
AB1 Locate and interpret written information
AB2 Read and interpret workplace documents
AB3 Identify relevant details, facts, and specifications
AB4 Record information accurately and completely
AB5 Demonstrate competence in organizing, writing, and editing using correct vocabulary, spelling, grammar, and punctuation
AB6 Demonstrate the ability to write clearly and concisely using industry specific terminology

AC CRITICAL THINKING AND PROBLEM SOLVING
AC1 Utilize critical-thinking skills to determine best options/outcomes (e.g., analyze reliable/unreliable sources of information, use previous experiences, implement crisis management, develop contingency planning)
AC2 Utilize innovation and problem-solving skills to arrive at the best solution for current situation
AC3 Implement effective decision-making skills

AD MATHEMATICS
AD1 Perform basic and higher-level math operations (e.g., addition, subtraction, multiplication, division, decimals, fractions, units of conversion, averaging, percentage, proportion, ratios)
AD2 Solve problems using measurement skills (e.g., distance, weight, area, volume)
AD3 Make reasonable estimates
AD4 Use tables, graphs, diagrams, and charts to obtain or convey information
AD5 Use deductive reasoning and problem-solving in mathematics

AE FINANCIAL LITERACY

AE1 Locate, evaluate, and apply personal financial information
AE2 Identify the components of a budget and how one is created
AE3 Set personal financial goals and develop a plan for achieving them
AE4 Use financial services effectively
AE5 Demonstrate ability to meet financial obligations

AF INTERNET USE AND SECURITY

AF1 Recognize the potential risks associated with Internet use
AF2 Identify and apply Internet security practices (e.g., password security, login, logout, log off, lock computer)
AF3 Practice safe, legal, and responsible use of technology in the workplace

AG INFORMATION TECHNOLOGY

AG1 Use technology appropriately to enhance professional presentations
AG2 Demonstrate effective and appropriate use of social media
AG3 Identify ways social media can be used as marketing, advertising, and data gathering tools

AH TELECOMMUNICATIONS

AH1 Select and use appropriate devices, services, and applications to complete workplace tasks
AH2 Demonstrate appropriate etiquette when using e-communications (e.g., cell phone, e-mail, personal digital assistants, online meetings, conference calls)
EMPLOYABILITY SKILLS

EA POSITIVE WORK ETHIC
EA1 Demonstrate enthusiasm and confidence about work and learning new tasks
EA2 Demonstrate consistent and punctual attendance
EA3 Demonstrate initiative in assuming tasks
EA4 Exhibit dependability in the workplace
EA5 Take and provide direction in the workplace
EA6 Accept responsibility for personal decisions and actions

EB INTEGRITY
EB1 Abide by workplace policies and procedures
EB2 Demonstrate honesty and reliability
EB3 Demonstrate ethical characteristics and behaviors
EB4 Maintain confidentiality and integrity of sensitive company information
EB5 Demonstrate loyalty to the company

EC SELF-REPRESENTATION
EC1 Demonstrate appropriate dress and hygiene in the workplace
EC2 Use language and manners suitable for the workplace
EC3 Demonstrate polite and respectful behavior toward others
EC4 Demonstrate personal accountability in the workplace
EC5 Demonstrate pride in work

ED TIME, TASK, AND RESOURCE MANAGEMENT
ED1 Plan and follow a work schedule
ED2 Work with minimal supervision
ED3 Work within budgetary constraints
ED4 Demonstrate ability to stay on task to produce high quality deliverables on time
**EE DIVERSITY AWARENESS**

EE1 Recognize diversity, discrimination, harassment, and equity

EE2 Work well with all customers and co-worker

EE3 Explain the benefits of diversity within the workplace

EE4 Explain the importance of respect for feelings, values, and beliefs of others

EE5 Identify strategies to bridge cultural/generational differences and use differing perspectives to increase overall quality of work

EE6 Illustrate techniques for eliminating gender bias and stereotyping in the workplace

EE7 Identify ways tasks can be structured to accommodate the diverse needs of workers

EE8 Recognize the challenges and advantages of a global workforce

**EF TEAMWORK**

EF1 Recognize the characteristics of a team environment and conventional workplace

EF2 Contribute to the success of the team

EF3 Demonstrate effective team skills and evaluate their importance in the workplace (e.g., setting goals, listening, following directions, questioning, dividing work)

**EG CREATIVITY AND RESOURCEFULNESS**

EG1 Contribute new ideas

EG2 Stimulate ideas by posing questions

EG3 Value varying ideas and opinions

EG4 Locate and verify information

**EH CONFLICT RESOLUTION**

EH1 Identify conflict resolution skills to enhance productivity and improve workplace relationships

EH2 Implement conflict resolution strategies and problem-solving skills

EH3 Explain the use of documentation and its role as a component of conflict resolution

**EI CUSTOMER/CLIENT SERVICE**

EI1 Recognize the importance of and demonstrate how to properly acknowledge customers/clients

EI2 Identify and address needs of customers/clients
EI3 Provide helpful, courteous, and knowledgeable service

EI4 Identify appropriate channels of communication with customers/clients (e.g., phone call, face-to-face, e-mail, website)

EI5 Identify techniques to seek and use customer/client feedback to improve company services

EI6 Recognize the relationship between customer/client satisfaction and company success

**EJ ORGANIZATIONS, SYSTEMS, AND CLIMATES**

EJ1 Define profit and evaluate the cost of conducting business

EJ2 Identify "big picture" issues in conducting business

EJ3 Identify role in fulfilling the mission of the workplace

EJ4 Identify the rights of workers (e.g., adult and child labor laws and other equal employment opportunity laws)

EJ5 Recognize the chain of command, organizational flow chart system, and hierarchy of management within an organization

**EK JOB ACQUISITION AND ADVANCEMENT**

EK1 Recognize the importance of maintaining a job and pursuing a career

EK2 Define jobs associated with a specific career path or profession

EK3 Identify and seek various job opportunities (e.g., volunteerism, internships, co-op, part-time/full-time employment)

EK4 Prepare a resume, letter of application, and job application

EK5 Prepare for a job interview (e.g., research company, highlight personal strengths, prepare questions, set-up a mock interview, dress appropriately)

EK6 Participate in a job interview

EK7 Explain the proper procedure for leaving a job

**EL LIFELONG LEARNING**

EL1 Acquire current and emerging industry-related information

EL2 Demonstrate commitment to learning as a life-long process and recognize learning opportunities

EL3 Seek and capitalize on self-improvement opportunities

EL4 Discuss the importance of flexible career planning and career self-management
EL5 Employ leadership skills to achieve workplace objectives (e.g., personal vision, adaptability, change, shared vision)

EL6 Recognize the importance of job performance evaluation and coaching as it relates to career advancement

EL7 Accept and provide constructive criticism

EL8 Describe the impact of the global economy on jobs and careers

**EM JOB SPECIFIC TECHNOLOGIES**

EM1 Identify the value of new technologies and their impact on driving continuous change and the need for life-long learning

EM2 Research and identify emerging technologies for specific careers

EM3 Select appropriate technological resources to accomplish work

**EN HEALTH AND SAFETY**

EN1 Assume responsibility for safety of self and others

EN2 Follow safety guidelines in the workplace

EN3 Manage personal health and wellness
OCCUPATIONAL SKILLS

OA IMPACTS OF COMPUTING

OA1 Reduce bias and equity deficits through the design of accessible computational artifacts

OA2 Evaluate and assess how computing impacts personal, ethical, social, economic and cultural practices

OA3 Research how computational innovations that have revolutionized aspects of our culture might have evolved from a need to solve a problem

OA4 Explain the beneficial and harmful effects that laws governing data (e.g., intellectual property, privacy) can have on innovation

OA5 Evaluate and design computational artifacts to maximize their benefit to society

OA6 Evaluate the impact of the digital divide (i.e., inequity of computing access, education, influence) on the development of local communities and society

OA7 Demonstrate ways computational design (i.e., algorithms, abstractions, analysis) can apply to problems across disciplines

OA8 Debate laws and regulations that impact the development and use of software and the protection of privacy

OB PROJECT MANAGEMENT

OB1 Identify and empathize with user problems, needs and establish goals to meet those needs

OB2 Demonstrate knowledge of scope management to control project schedule, estimate project cost and conduct planning

OB3 Identify tools and resources for the project

OB4 Identify critical milestones

OB5 Report project status

OC COMPUTING SYSTEMS

OC1 Explain how abstractions hide the underlying implementation details of computing systems embedded in everyday objects

OD DATA AND ANALYSIS

OD1 Collect data using appropriate data collection tools and techniques to support a claim or to communicate information

OD2 Explain the privacy concerns related to the collection and generation of data
OE ALGORITHMS AND PROGRAMMING

OE1 Use and adapt classic algorithms to solve computational problems

OE2 Evaluate algorithms in terms of their efficiency, correctness and clarity

OE3 Compare and contrast fundamental data structures and their uses

OE4 Illustrate the flow of execution of a recursive algorithm

OE5 Construct solutions to problems using student-created components (e.g., procedures, modules, objects)

OE6 Analyze a large-scale computational problem and identify generalizable patterns that can be applied to a solution

OE7 Select and employ an appropriate component or library to facilitate programming solutions

OE8 Use a development process in creating a computational artifact that leads to a minimum viable product followed by reflection, analysis and iteration

OE9 Use functions, data structures or objects to simplify solutions, generalizing computational problems instead of repeated use of simple variables

OE10 Design and iteratively develop event-driven computational artifacts for practical intent, personal expression, or to address a societal issue

OE11 Decompose problems into smaller components through systematic analysis using constructs (e.g., procedures, modules, objects)

OE12 Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests

OE13 Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs

OE14 Evaluate and refine computational artifacts to make them more usable and accessible using systematic testing and debugging

OE15 Systematically design and develop programs for broad audiences by incorporating feedback from users

OE16 Design and develop computational artifacts working in team roles using collaborative tools

OE17 Describe how artificial intelligence drives many software and physical systems

OE18 Use version control systems, integrated development environments (IDEs), and collaborative tools and practices (e.g., code documentation) in a group software project

OE19 Modify an existing program to add additional functionality and discuss intended and unintended implications (e.g., introducing errors)

OE20 Evaluate key qualities (i.e., correctness, usability, readability, efficiency) of a program
OE21 Compare multiple programming languages and discuss how their features make them suitable for solving different types of problems

OE22 Justify the selection of specific control structures when tradeoffs involve implementation, readability and program performance, and explain the benefits and drawbacks of choices made

OE23 Develop programs for multiple computing platforms

OE24 Evaluate licenses that limit or restrict use of computational artifacts when using resources (e.g., libraries)

OF NETWORKS AND THE INTERNET

OF1 Give examples to illustrate how sensitive data can be affected by viruses, malware and other attacks