

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 Utilize speaking and listening skills to communicate effectively with customers and co-workers

AB READING AND WRITING

AB1 Locate and interpret written information

AB2 Read and interpret workplace documents, e.g., reports, manuals, schematics, flowcharts, tables, graphs

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 the 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, numbering systems

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 reasoning and problem-solving skills 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 Describe types of financial service providers and considerations in selecting a provider

AE5 Demonstrate ability to meet financial obligations

AF INTERNET USE AND SECURITY

AF1 Recognize the potential risks associated with internet and social media 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, appropriate and ethical use of social media

AG3 Identify ways social media can be used as marketing, advertising and data gathering tools

AH TELECOMMUNICATIONS

AH1 Select and utilize the appropriate environment, devices, services and applications to complete workplace tasks

AH2 Demonstrate appropriate etiquette when using telecommunications, e.g., cell phone, e-mail, messaging services, online meetings, conference calls

EMPLOYABILITY SKILLS

EA POSITIVE WORK ETHIC

EA1 Explain the importance of pride 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, e.g., safety, internet and cell phone use, code of conduct

EB2 Demonstrate honesty and reliability

EB3 Demonstrate ethical characteristics and behaviors

EB4 Maintain confidentiality and integrity of company information

EB5 Support the mission and vision of 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

ED TIME, TASK AND RESOURCE MANAGEMENT

ED1 Plan and follow a work schedule

ED2 Complete work tasks successfully with minimal supervision

ED3 Work successfully within budgetary constraints

ED4 Demonstrate ability to stay on task to produce high-quality deliverables on time

EE DIVERSITY AWARENESS

EE1 Define and differentiate diversity, equity, inclusion, discrimination and harassment

EE2 Work effectively with all customers and co-workers

EE3 Explain the benefits of diversity within the workplace

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

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

EE6 Illustrate techniques for eliminating 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 Demonstrate effective team skills, e.g., setting goals, listening, following directions, questioning, dividing work, conflict resolution, meeting facilitation, and evaluate their importance in the workplace

EG CREATIVITY AND RESOURCEFULNESS

EG1 Explain the importance of contributing and conveying new ideas in the workplace

EG2 Describe the importance of posing questions when developing ideas

EG3 Explain the value of varying ideas and opinions

EG4 Locate and verify information during the creative process

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 greet/approach customers and 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., online, phone call, face-to-face

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

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

EJ ORGANIZATIONS, SYSTEMS AND CLIMATES

EJ1 Define profit and identify factors affecting the profitability of a business

EJ2 Identify "big picture" issues in conducting business, e.g., forecasting, global market, risk management

EJ3 Identify roles 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 work experience opportunities, e.g., volunteerism, internships, co-op, part-time/full-time employment

EK4 Prepare a resume, cover letter and job application

EK5 Prepare for and participate in a job interview, e.g., research company, highlight personal strengths, prepare questions, conduct a mock interview, dress appropriately

EK6 Explain the components of a successful job interview

EK7 Identify key factors to evaluate employment offers, e.g., salary, benefits packages

EK8 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 Identify various self-improvement opportunities

EL4 Explain the importance of adaptability in career planning and self-management, e.g., diverse portfolio, credentials, professional development

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 lifelong learning

EM2 Research and identify emerging technologies for specific careers

EM3 Select appropriate technological resources to accomplish work

EN HEALTH AND SAFETY

EN1 Identify and assume responsibility for the safety of self and others

EN2 Follow safety guidelines in the workplace, e.g., OSHA, CDC

EN3 Explain the impact of personal health and wellness on job performance

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, e.g., 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