# Information Technology Career Cluster
# Cloud Computing
## Course Number: 11.44700

### Course Description:

The Cloud Computing course is intended for students who seek an overall understanding of cloud computing, independent of specific technical roles, cloud concepts, core services, security, architecture, and support. Students dive deeply into cloud computing best practices and learn how cloud computing helps users develop a global infrastructure to support use case at scale while also developing and inventing innovative technologies. Innovation through cloud computing is making a major impact in nearly every industry, including healthcare, finance, manufacturing, government, and nonprofit. The global public cloud computing market has consistently grown 15 percent year after year and is projected to continue to grow annually. This course utilizes hands-on practical lab activities to explore and build cloud technologies.

Students will not only understand the concepts but apply their knowledge to situations and defend their actions/decisions/choices through the knowledge and skills acquired in this course. Employability skills are integrated into activities, tasks, and projects throughout the course standards to demonstrate the skills required by business and industry. Competencies in the co-curricular student organizations are integral components of both the employability skills standards and content standards for this course. Various forms of technologies will be highlighted to expose students to the emerging technologies impacting the digital world. Professional communication skills and practices, problem-solving, ethical and legal issues, and the impact of effective presentation skills are taught in this course as a foundational knowledge to prepare students to be college and career ready. The knowledge and skills taught in this course build upon each other to form a comprehensive introduction to the digital world.

Cloud Computing is the third course in the Cloud Computing career pathway. Students enrolled in this course should have successfully completed Introduction to Digital Technology and Computer Science Principles, in that order. After mastery of the standards in this course, students should be prepared to earn an industry-recognized credential in this career area, such as AWS Certified Cloud Practitioner (https://aws.amazon.com/certification/certified-cloud-practitioner/), Google Associate Cloud Engineer (https://cloud.google.com/certification/cloud-engineer), or Microsoft Certified Azure Fundamentals (https://docs.microsoft.com/en-us/learn/certifications/azure-fundamentals/).

## Course Standard 1

**IT-CC-1**

The following standard is included in all CTAE courses adopted for the Career Cluster/Pathways. Teachers should incorporate the elements of this standard into lesson plans during the course. The topics listed for each element of the standard may be addressed in differentiated instruction matching the content of each course. These elements may also be addressed with specific lessons from a variety of resources. This content is not to be treated as a unit or separate body of knowledge but rather integrated into class activities as applications of the concept.

## Standard: Demonstrate employability skills required by business and industry.

The following elements should be integrated throughout the content of this course.

**1.1 Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities**.

| Person-to-Person Etiquette | Telephone and Email Etiquette | Cell Phone and Internet Etiquette | Communicating At Work | Listening |
|---|---|---|---|---|
| Interacting with Your Boss | Telephone Conversations | Using Blogs | Improving Communication Skills | Reasons, Benefits, and Barriers |
| Interacting with Subordinates | Barriers to Phone conversations | Using Social Media | Effective Oral Communication | Listening Strategies |
| Interacting with Co-workers | Making and Returning Calls | | Effective Written Communication | Ways We Filter What We Hear |
| Interacting with Suppliers | Making Cold Calls | | Effective Nonverbal Skills | Developing a Listening Attitude |
| | Handling Conference Calls | | Effective Word Use | Show You Are Listening |
| | Handling Unsolicited Calls | | Giving and Receiving Feedback | Asking Questions |
| | | | | Obtaining Feedback |
| | | | | Getting Others to Listen |

| Nonverbal Communication | Written Communication | Speaking | Applications and Effective Résumés |
|---|---|---|---|
| Communicating Nonverbally | Writing Documents | Using Language Carefully | Completing a Job Application |
| Reading Body Language and mixed Messages | Constructive Criticism in Writing | One-on-One Conversations | Writing a Cover Letter |
| Matching Verbal and Nonverbal communication | | Small Group Communication | Things to Include in a Résumé |
| Improving Nonverbal Indicators | | Large Group Communication | Selling Yourself in a Résumé |
| Nonverbal Feedback | | Making Speeches | Terms to Use in a Résumé |
| Showing Confidence Nonverbally | | Involving the Audience | Describing Your Job Strengths |
| Showing Assertiveness | | Answering Questions | Organizing Your Résumé |
| | | Visual and Media Aids | Writing an Electronic Résumé |
| | | Errors in Presentation | Dressing Up Your Résumé |

**1.2 Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.**

| Teamwork and Problem Solving | Meeting Etiquette |
|---|---|
| Thinking Creatively | Preparation and Participation in Meetings |
| Taking Risks | Conducting Two-Person or Large Group Meetings |
| Building Team Communication | Inviting and Introducing Speakers |
| | Facilitating Discussions and Closing |
| | Preparing Visual Aids |
| | Virtual Meetings |

**1.3 Exhibit critical thinking and problem-solving skills to locate, analyze and apply information in career planning and employment situations.**

| Problem Solving | Customer Service | The Application Process | Interviewing Skills | Finding the Right Job |
|---|---|---|---|---|
| Transferable Job Skills | Gaining Trust and Interacting with Customers | Providing Information, Accuracy and Double Checking | Preparing for an Interview | Locating Jobs and Networking |
| Becoming a Problem Solver | Learning and Giving Customers What They Want | Online Application Process | Questions to Ask in an Interview | Job Shopping Online |
| Identifying a Problem | Keeping Customers Coming Back | Following Up After Submitting an Application | Things to Include in a Career Portfolio | Job Search Websites |
| Becoming a Critical Thinker | Seeing the Customer's Point | Effective Résumés: | Traits Employers are Seeking | Participation in Job Fairs |
| Managing | Selling Yourself and the Company | Matching Your Talents to a Job | Considerations Before Taking a Job | Searching the Classified Ads |
| | Handling Customer Complaints | When a Résumé Should be Used | | Using Employment Agencies |
| | Strategies for Customer Service | | | Landing an Internship |
| | | | | Staying Motivated to Search |

**1.4 Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.**

| Workplace Ethics | Personal Characteristics | Employer Expectations | Business Etiquette | Communicating at Work |
|---|---|---|---|---|
| Demonstrating Good Work Ethic | Demonstrating a Good Attitude | Behaviors Employers Expect | Language and Behavior | Handling Anger |
| Behaving Appropriately | Gaining and Showing Respect | Objectionable Behaviors | Keeping Information Confidential | Dealing with Difficult Coworkers |
| Maintaining Honesty | Demonstrating Responsibility | Establishing Credibility | Avoiding Gossip | Dealing with a Difficult Boss |
| Playing Fair | Showing Dependability | Demonstrating Your Skills | Appropriate Work Email | Dealing with Difficult Customers |
| Using Ethical Language | Being Courteous | Building Work Relationships | Cell Phone Etiquette | Dealing with Conflict |
| Showing Responsibility | Gaining Coworkers' Trust | | Appropriate Work Texting | |
| Reducing Harassment | Persevering | | Understanding Copyright | |
| Respecting Diversity | Handling Criticism | | Social Networking | |
| Making Truthfulness a Habit | Showing Professionalism | | | |
| Leaving a Job Ethically | | | | |

**1.5 Apply the appropriate skill sets to be productive in a changing, technological, diverse workplace to be able to work independently and apply team-work skills.**

| Expected Work Traits | Teamwork | Time Management |
|---|---|---|
| Demonstrating Responsibility | Teamwork Skills | Managing Time |
| Dealing with Information Overload | Reasons Companies Use Teams | Putting First Things First |
| Transferable Job Skills | Decisions Teams Make | Juggling Many Priorities |

| | | |
|---|---|---|
| Managing Change | Team Responsibilities | Overcoming Procrastination |
| Adopting a New Technology | Problems That Affect Teams | Organizing Workspace and Tasks |
| | Expressing Yourself on a Team | Staying Organized |
| | Giving and Receiving Constructive Criticism | Finding More Time |
| | | Managing Projects |
| | | Prioritizing Personal and Work Life |

**1.6 Present a professional image through appearance, behavior, and language.**

| On-the-Job Etiquette | Person-to-Person Etiquette | Communication Etiquette | Presenting Yourself |
|---|---|---|---|
| Using Professional Manners | Meeting Business Acquaintances | Creating a Good Impression | Looking Professional |
| Introducing People | Meeting People for the First Time | Keeping Phone Calls Professional | Dressing for Success |
| Appropriate Dress | Showing Politeness | Proper Use of Work Email | Showing a Professional Attitude |
| Business Meal Functions | | Proper Use of Cell Phone | Using Good Posture |
| Behavior at Work Parties | | Proper Use in Texting | Presenting Yourself to Associates |
| Behavior at Conventions | | | Accepting Criticism |
| International Etiquette | | | Demonstrating Leadership |
| Cross-Cultural Etiquette | | | |
| Working in a Cubicle | | | |

## Course Standard 2

**IT-CC-2**

Describe the structure and features of cloud computing, including services, benefits, and types of cloud computing.

2.1 Define cloud computing and its impact on business and society.
2.2 Identify and compare the benefits of cloud computing over on-premises computing.
2.3 Compare the services offered by the main cloud computing providers, such as Amazon, Microsoft, Google, and others.
2.4 Compare the types of cloud computing, including Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS), and describe scenarios where each could be used to improve a business.
2.5 Explain the purpose of region, availability zone, and edge location and the connections among them.

## Course Standard 3

**IT-CC-3**

Demonstrate how to store and share content in the cloud.

3.1 Identify features and functions of commonly used cloud services.
3.2 Access and navigate to commonly used services in cloud computing consoles.
3.3 Analyze how cloud services are used in industry.
3.4 Explain the functions of a domain name system (DNS)
3.5 Create an object storage bucket, such as AWS S3, Azure Blob Storage, and others.
3.6 Explain the benefits and uses of a content delivery network.

3.7 Configure web content distribution via edge locations and attach it to a website.
3.8 Identify the benefits, features, and use cases of different types of cloud storage.
3.9 Analyze a use case and recommend the best type of virtual storage for the particular situation.
3.10 Create an appropriate storage volume or physical record and attach it to a virtual computing instance.
3.11 Create a virtual computing instance that hosts a simple website. Upload to online career portfolio.

## Course Standard 4

**IT-CC-4**

Utilize best practices in monitoring and securing content stored in the cloud.

4.1 Recognize best practices for identity and access management (IAM).
4.2 Analyze the cultural and societal impacts of cloud security.
4.3 Differentiate among a role, user, and policy in cloud security.
4.4 Use a process to resolve vulnerabilities in a web server.
4.5 Determine whether security best practices are being followed and recommend steps to fix any security lapses.
4.6 Identify the best cloud security service for a given scenario.
4.7 Use an IAM system to set up a text alert event.
4.8 Compare monitoring and logging services.
4.9 Identify potential vulnerabilities on the network and propose solutions to secure the network to protect content stored in the cloud.

## Course Standard 5

**IT-CC-5**

Design, develop, and deploy a virtual private network (VPN).

5.1 Describe features and benefits of load balancing.
5.2 Attach a load balancer to a webpage.
5.3 Evaluate the performance of a load balancer.
5.4 Compare relational and nonrelational databases.
5.5 Compare online transaction processing and online analytics processing.
5.6 Describe the benefits of caching data.
5.7 Use a template infrastructure as code (IaC) tool to build a virtual private network (VPN), such as AWS Virtual Private Cloud, Azure Virtual Network, and others. Upload to online career portfolio.

## Course Standard 6

**IT-CC-6**

Assess the impact (advantages and disadvantages) of emerging technologies in cloud computing.

6.1 Describe machine learning and explain its impact on society, business, and technology.
6.2 Identify potential use cases for emerging technology in the cloud.
6.3 Use calculator tools to assess value propositions of using cloud technology, including monthly cost and total cost.
6.4 Identify cloud services that can analyze and protect data and manage networks.
6.5 Explain benefits of blockchain technologies.
6.6 Explain the infrastructure of cloud development kits or services.
6.7 Use a software development framework to model and provision a cloud application.

## Course Standard 7

**IT-CC-7**

Detect and resolve common security alerts using the most efficient methods for given situations.

7.1 Describe the shared responsibility security model.
7.2 Determine security responsibility for cloud resources.
7.3 Analyze how the shared security model accounts for common threats to the cloud computing model.
7.4 List the steps required to resolve an automated security alert.
7.5 Describe the six instance states, including pending, running, stopping, stopped, shutting down, and terminated.
7.6 Diagram the transitions between instance states from launch to termination.
7.7 Explain instance usage billing for each instance state.
7.8 Determine the optimal instance state for a given situation.

## Course Standard 8

**IT-CC-8**

Create a cloud environment that is scalable.

8.1 Recall the process for setting up a static website.
8.2 Compare static and dynamic websites.
8.3 Create a content delivery network distribution to increase the speed of your website. Upload to online career portfolio.
8.4 Use a process to launch a dynamic web server.
8.5 Create a serverless compute function using a serverless compute console. Upload to online career portfolio.
8.6 Describe the main functions of auto scaling.
8.7 Create a launch template and an auto scaling group.
8.8 Develop a plan for monitoring an auto scaling instance or group. Upload to online career portfolio.

## Course Standard 9

**IT-CC-9**

Integrate emerging technologies into a cloud computing environment.

9.1 Recognize capabilities of artificial intelligence (AI) and analyze the ethical implications.
9.2 Identify an AI product that would help address a need or problem in a given situation.
9.3 Appraise the value of emerging AI technology.
9.4 Determine cases where machine learning (ML) could be used.
9.5 Explain how machine learning can help address a need or problem in a given situation.
9.6 Create a machine learning algorithm. Upload to online career portfolio.
9.7 Evaluate how AI and ML support deep learning.
9.8 Evaluate how AI and ML support enterprise and business intelligence.
9.9 Define Internet of Things (IoT) and explain its relationship to cloud technology.
9.10 Explain how IoT products or services can address a given need or problem.
9.11 Explain the concept of infrastructure as code (IaC), such as AWS CloudFormation, Azure Resource Manager, and others.
9.12 Examine a template which uses an IaC tool to determine the configuration of services.
9.13 Develop a template using an IaC tool that addresses a given user need. Upload to online career portfolio.

## Course Standard 10

**IT-CC-10**

Demonstrate the safe and effective use of big data, including cryptocurrency.

10.1 Define big data and identify cases where it would be used (use case) in various industries.
10.2 Evaluate pros and cons of big data.
10.3 Explain how blockchain ensures the validity and immutability of transactions, particularly in the cloud.
10.4 Evaluate the pros and cons of blockchain business applications.

## Course Standard 11

**IT-CC-11**

Organize personal online career portfolio for specific career interests.

11.1 Review and update résumé to reflect new knowledge and skills master and additional work experience.
11.2 Organize folders within the portfolio to reflect specific careers of interest, including résumé, targeted cover letter, and artifacts relevant to the specific career.
11.3 Update all current items in the portfolio.
11.4 Identify and upload additional industry-appropriate artifacts reflective of mastered skills throughout this course.
11.5 Polish all entries in the online career portfolio to ensure accuracy and professionalism as expected from employers.
11.6 Conduct a job search and share the appropriate folder with the potential employer.

## Course Standard 12

**IT-CC-12**

**Explore how related student organizations are integral parts of career and technology education courses through leadership development, school and community service projects, entrepreneurship development, and competitive events.**

12.1 Explain the goals, mission, and objectives of Future Business Leaders of America (FBLA) and/or Technology Student Association (TSA) and/or SkillsUSA.
12.2 Explore the impact and opportunities a student organization (FBLA, TSA, SkillsUSA) can develop to bring business and education together in a positive working relationship through innovative leadership and career development programs.
12.3 Explore the local, state, and national opportunities available to students through participation in related student organizations (FBLA, TSA, SkillsUSA) including but not limited to conferences, competitions, community service, philanthropy, and other student organization activities.
12.4 Explain how participation in career and technology education student organizations can promote lifelong responsibility for community service and professional development.
12.5 Explore the competitive events related to the content of this course and the required competencies, skills, and knowledge for each related event for individual, team, and chapter competitions.