

**Information Technology Career Cluster  
Artificial Intelligence Concepts  
Course Number 11.44400**

**Course Description:**

Artificial Intelligence Concepts is the second course in the Artificial Intelligence pathway. Students will build upon their foundational understanding of Artificial Intelligence from course one and deepen their understanding of Artificial Intelligence and machine learning concepts. The course continues to explore the elements from course one, with an emphasis on using data science and programming to solve problems. The course requires students to explore real-world applications, potential benefits, and problems, as well as ethical considerations. Students will work to design potential solutions to problems using learning from this course.

**Course Standard 1**

**IT-AIC-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

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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

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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 teamwork skills.**

<b>Expected Work Traits</b>	<b>Teamwork</b>	<b>Time Management</b>
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.**

<b>On-the-Job Etiquette</b>	<b>Person-to-Person Etiquette</b>	<b>Communication Etiquette</b>	<b>Presenting Yourself</b>
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			

**Support of CTAE Foundation Course Standards and Georgia Standards of Excellence L9-10RST 1-10 and L9-10WHST 1-10:**

Georgia Standards of Excellence ELA/Literacy standards have been written specifically for technical subjects and have been adopted as part of the official standards for all CTAE courses.

**Course Standard 2**

**IT-AIC-2**

**Identify, research, and analyze historical and current artificial intelligence developments.**

- 2.1 Identify and summarize how Artificial Intelligence has influenced elements of history and is currently shaping contemporary events.
- 2.2 Identify, research, and analyze current events in the field of Artificial Intelligence, considering new technology developments, social and ethical impact, and future implication.
- 2.3 Analyze the impact new Artificial Intelligence developments have or will have on its intended users and society at large.
- 2.4 Identify current and predicted trends or changes in the Artificial Intelligence industry.

### Course Standard 3

#### IT-AIC-3

##### Define and investigate examples of artificial intelligence applications.

- 3.1 Define the function of and classify examples of critical and contemporary areas of Artificial Intelligence (e.g., machine learning, natural language processing, computer vision).
- 3.2 Define and classify examples of supervised learning, including regression and classification; unsupervised learning, including clustering; and reinforcement learning.
- 3.3 Using a web tool that trains a machine learning model without coding (e.g., Google Teachable Machine, Weka), plan and conduct an experiment to train a model to recognize data (e.g., photos, videos, audio, etc.) and to distinguish between at least three different categories you define (e.g., bicycles, motorcycles, scooters; jazz, hip-hop, classical music).
- 3.4 Predict what information the trained machine from your experiment might use to classify data.
- 3.5 Construct an argument using data that explains how your machine learning experiment model works and evaluate if it was successful.
- 3.6 Investigate how the different examples Artificial Intelligence you interact with daily (e.g., social media, gaming, smartphones, shopping, etc.) work and determine what type(s) of Artificial Intelligence is being used (e.g., machine learning, natural language processing, computer vision).

### Course Standard 4

#### IT-AIC-4

##### Develop computer programs to solve problems using an object-oriented language and elements of artificial intelligence.

- 4.1 Define, explain, and apply the ideas of pattern matching, recursion, parallelization, and automation to algorithms and programs.
- 4.2 Describe the benefits and principles of object-oriented programming.
- 4.3 Define and apply objects and recognize the difference between an object and an instance.
- 4.4 Apply principles of object-oriented programming to declare methods and combine classes.
- 4.5 Define and implement different logical, relational, Boolean, and mathematical operators.
- 4.6 Identify, assign, and convert values and different data types to variables in programs.
- 4.7 Implement different types of control structures in programs (e.g., conditionals, loops, functions).
- 4.8 Describe and implement a function, including those with return statements and different parameters.
- 4.9 Use external libraries in programs.
- 4.10 Identify a list as an ordered series of data under one variable name and accessed with numeric indices.
- 4.11 Determine which data structures are most appropriate to model the program data (e.g., list, set, dictionary, and tuple).
- 4.12 Implement data structures (e.g., lists, sets, dictionaries, and tuples) as function parameters, return values, and internal variables within function bodies.
- 4.13 Differentiate between methods and functions and analyze the effect of a method call on a program.
- 4.14 Construct and implement strings in programs.
- 4.15 Define and implement professional programming practices (e.g., commenting and documentation, file storage, naming conventions).
- 4.16 Implement a debugging process.

### Course Standard 5

#### IT-AIC-5

##### Collect, manipulate, and visualize data and investigate the role of data science in artificial intelligence.

- 5.1 Identify examples of data science in the world around us and investigate its impact on technology and users.
- 5.2 Identify examples of ethical issues in data science.
- 5.3 Describe how data is used in different Artificial Intelligence applications.

- 5.4 Define, compare, and contrast a spreadsheet and a database.
- 5.5 Define and describe the function of a Database Management System Language (DMBS) (e.g., SQL).
- 5.6 Define dataset and Data Frame.
- 5.7 Implement spreadsheet functions, formulas, conditional formatting, cell referencing, and pivot tables.
- 5.8 Create data tables and graphic representations of data including two-way tables, scatterplots, bar graphs, histograms, stem plots, and dot plots from a spreadsheet software or other data visualization tools (e.g., Jupyter Notebooks, Matplotlib).
- 5.9 Utilize visual reporting and statistical tools to define and understand statistics such as regression analysis, ANOVA, hypothesis testing, and sampling distributions.

## Course Standard 6

### IT-AIC-6

#### **Investigate and design potential solutions to social and ethical issues related to artificial intelligence.**

- 6.1 Identify real examples of issues related to bias, perception, privacy, and accuracy in Artificial Intelligence.
- 6.2 Investigate and propose solutions to ethical and societal Artificial Intelligence issues in a variety of settings (e.g., public safety, finance, social media marketing, government use).
- 6.3 Using a web tool that trains a machine learning model without coding, investigate examples of bias and identify solutions.
- 6.4 Identify and analyze examples of legal policies related to Artificial Intelligence, including why and how they were or are being developed.
- 6.5 Analyze real world Artificial Intelligence scenarios to determine the ethical and legal implications.
- 6.6 Identify and research projects from the Artificial Intelligence for Good Foundation or other similar organizations (e.g., The Center for Human Compatible Artificial Intelligence, The Future of Life Institute) and design potential solutions to the problems identified.

## Course Standard 7

### IT-AIC-7

#### **Apply problem-solving skills to solve real-world problems.**

- 7.1 Identify and investigate a real-world problem of interest that might be solved with Artificial Intelligence.
- 7.2 Use a problem-solving process (e.g., Design Thinking) to design a creative solution to a real-world problem that could be solved with Artificial Intelligence.
- 7.3 Apply programming, logic, and data science to solve problems.

## Course Standard 8

### IT-AIC-8

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

- 8.1 Explain the goals, mission, and objectives of the career-technical student organization (CTSO).
- 8.2 Explore the impact and opportunities a student organization can develop to bring business and education together in a positive working relationship through innovative leadership and career development programs.
- 8.3 Explore the local, state, and national opportunities available to students through participation in related student organization including but not limited to conferences, competitions, community service, philanthropy, and other CTSO activities.
- 8.4 Explain how participation in career and technology education student organizations can promote lifelong responsibility for community service and professional development.
- 8.5 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.