Information Technology Career Cluster
Artificial Intelligence Applications
Course Number (Given by GaDOE-CTAE)

Course Description:
Artificial Intelligence Applications is the third course in the Artificial Intelligence pathway. This course deepens students' understanding from courses one and two by requiring students to design and apply Artificial Intelligence solutions. The course focuses on creating functional, real-world applications of Artificial Intelligence using machine learning. Students will apply professional software development tools and processes to solve problems using elements of machine learning, with an emphasis on embedded computing systems. Students enrolled in this course should have successfully completed Foundations of Artificial Intelligence, and Artificial Intelligence Concepts. After mastery of the standards in this course, students should be prepared to take the end of pathway assessment in this career area.

Course Standard 1

IT-AIA-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 teamwork 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			

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-AIA-2

Identify, research, and analyze current artificial intelligence developments.

2.1 Identify, research, and analyze current events in the field of Artificial Intelligence, considering new technology developments, social and ethical impact, and future implication.

2.2 Identify and describe current challenges and opportunities in Artificial Intelligence technologies using non-Machine Learning aspects of Artificial Intelligence (e.g., genetic algorithms, robotics, computer vision, etc.).
2.3 Make predictions about the future trends or developments in the field of Artificial Intelligence based on current Artificial Intelligence applications.

Course Standard 3

IT-AIA-3
Identify and research artificial development solutions and development tools.

3.1 Identify and research networks and cloud services that use Artificial Intelligence solutions (Neural Networks, data management, different industry-specific solutions and services, Edge AI).
3.2 Identify Artificial Intelligence in a variety of industry solutions and services and make appropriate recommendations of Artificial Intelligence applications based on an industry need.
3.3 Define open source and identify open-source Artificial Intelligence tools (e.g., Tensorflow, Scikit-Learn, Spark ML, PyTorch).
3.4 Define proprietary and identify proprietary Artificial Intelligence tools (e.g., Microsoft Azure AI, Amazon Web Services, Google AI, IBM Watson).

Course Standard 4

IT-AIA-4
Design and develop programs using Artificial Intelligence to solve problems.

4.1 Define and apply a team-based software development process (e.g., Agile) using professional tools (e.g., Version Control System, GitHub).
4.2 Define and evaluate computational complexity, time complexity, and space complexity in programs.
4.3 Identify and use IDEs (e.g., VS Code, PyCharm, Jupyter, Sublime) and packages in program development (e.g., Fast AI, Scikit-Learn, Pandas, Runway ML, Tensorflow, Make Code, PyTorch) to build and train machine learning models.
4.4 Define and research an interest or problem that could be enhanced or solved with Artificial Intelligence.
4.5 Design and develop an Artificial Intelligence software solution that addresses a researched interest or problem that could be enhanced or solved.
4.6 Develop an online portfolio that showcases your software development skills and projects.

Course Standard 5

IT-AIA-5
Identify, evaluate, and manipulate data using reliable and ethical practices.

5.1 Define and distinguish between balanced and imbalanced datasets.
5.2 Identify potential problems with imbalance datasets.
5.3 Define and explain the difference between training, validation, and test datasets.
5.4 Discuss how bias can be present in datasets and analyze the implications, including ethical implications, of bias in data.
5.5 Define data collection, manipulation, cleansing, and transformation and describe how these can be used to improve datasets.
5.6 Identify different factors to consider when evaluating sources of data.
5.7 Identify, evaluate, and utilize existing datasets from reliable sources (e.g., Kaggle) to train machine learning models.
5.8 Explore and utilize packages from a data analysis and manipulation tool when training a machine learning model (e.g., Pandas).
5.9 Utilize visual reporting and statistical tools to perform, understand, and interpret statistics such as regression analysis, ANOVA, hypothesis testing, and sampling distributions.

Course Standard 6

IT-AIA-6

Apply problem-solving skills to design solutions for social and ethical issues.

6.1 Identify and research a real social or ethical problem in your community that might be solved with Artificial Intelligence.

6.2 Use a problem-solving process (e.g., Design Thinking) to collaboratively investigate the identified problem in your community.

6.3 Collaboratively design a solution that uses Artificial Intelligence for the problem identified in your community.

6.4 Develop a prototype or working model of your Artificial Intelligence solution.

Course Standard 7

IT-AIA-7

Design Artificial Intelligence solutions using embedded computing.

7.1 Identify and define the function of circuits, sensors, microcontrollers, motors, and other components used in embedded systems.

7.2 Assemble an embedded or robotic system that use circuits, sensor(s), microcontroller, microcomputers, motor(s) to complete a specific task.

7.3 Write a program for an embedded or robotic system that makes a decision based on sensor/user input, controls mechanics of the robot, and completes a “human” task (e.g., delivers items, opens a door for someone, solves a puzzle, etc.).

7.4 Use a problem-solving method to debug hardware issues.

Course Standard 8

IT-AIA-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.