

**Information Technology Career Cluster  
Artificial Intelligence Applications  
Course Number 11.44500**

**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      |

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|                                |  |                           |                               |
|--------------------------------|--|---------------------------|-------------------------------|
| 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 |

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|                             |                          |                             |                          |                       |
|-----------------------------|--------------------------|-----------------------------|--------------------------|-----------------------|
| 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.