Georgia CTAE

Artificial Intelligence Concepts (11.44400) (2021)

Adopted 2021

Demonstrate employability skills required by business and industry. IT-AIC-1	1. **Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.** IT-AIC-1.1 2. **Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.** IT-AIC-1.2 3. **Exhibit critical thinking and problem-solving skills to locate, analyze and apply information in career planning and employment situations.** IT-AIC-1.3 4. **Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.** IT-AIC-1.4 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.** IT-AIC-1.5 6. **Present a professional image through appearance, behavior, and language.** IT-AIC-1.6
Identify, research, and analyze historical and current artificial intelligence developments. IT-AIC-2	1. **Identify and summarize how Artificial Intelligence has influenced elements of history and is currently shaping contemporary events.** IT-AIC-2.1 2. **Identify, research, and analyze current events in the field of Artificial Intelligence, considering new technology developments, social and ethical impact, and future implication.** IT-AIC-2.2 3. **Analyze the impact new Artificial Intelligence developments have or will have on its intended users and society at large.** IT-AIC-2.3 4. **Identify current and predicted trends or changes in the Artificial Intelligence industry.** IT-AIC-2.4
Define and investigate examples of artificial intelligence applications. IT-AIC-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).** IT-AIC-3.1

2. **Define and classify examples of supervised learning, including regression and classification; unsupervised learning, including clustering; and reinforcement learning.** IT-AIC-3.2
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).** IT-AIC-3.3
4. **Predict what information the trained machine from your experiment might use to classify data.** IT-AIC-3.4
5. **Construct an argument using data that explains how your machine learning experiment model works and evaluate if it was successful.** IT-AIC-3.5
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).** IT-AIC-3.6

Develop computer programs to solve problems using an object-oriented language and elements of artificial intelligence. IT-AIC-4

1. **Define, explain, and apply the ideas of pattern matching, recursion, parallelization, and automation to algorithms and programs.** IT-AIC-4.1
2. **Describe the benefits and principles of object-oriented programming.** IT-AIC-4.2
3. **Define and apply objects and recognize the difference between an object and an instance.** IT-AIC-4.3
4. **Apply principles of object-oriented programing to declare methods and combine classes.** IT-AIC-4.4
5. **Define and implement different logical, relational, Boolean, and mathematical operators.** IT-AIC-4.5
6. **Identify, assign, and convert values and different data types to variables in programs.** IT-AIC-4.6
7. **Implement different types of control structures in programs (e.g., conditionals, loops, functions).** IT-AIC-4.7
8. **Describe and implement a function, including those with return statements and different parameters.** IT-AIC-4.8
9. **Use external libraries in programs.** IT-AIC-4.9
10. **Identify a list as an ordered series of data under one variable name and accessed with numeric indices.** IT-AIC-4.10

	11. Determine which data structures are most appropriate to model the program data (e.g., list, set, dictionary, and tuple). IT-AIC-4.11
	12. Implement data structures (e.g., lists, sets, dictionaries, and tuples) as function parameters, return values, and internal variables within function bodies. IT-AIC-4.12
	13. Differentiate between methods and functions and analyze the effect of a method call on a program. IT-AIC-4.13
	14. Construct and implement strings in programs. IT-AIC-4.14
	15. Define and implement professional programming practices (e.g., commenting and documentation, file storage, naming conventions). IT-AIC-4.15
	16. Implement a debugging process. IT-AIC-4.16
Collect, manipulate, and visualize data and investigate the role of data science in artificial intelligence. IT-AIC-5	1. Identify examples of data science in the world around us and investigate its impact on technology and users. IT-AIC-5.1
	2. Identify examples of ethical issues in data science. IT-AIC-5.2
	3. Describe how data is used in different Artificial Intelligence applications. IT-AIC-5.3
	4. Define, compare, and contrast a spreadsheet and a database. IT-AIC-5.4
	5. Define and describe the function of a Database Management System Language (DMBS) (e.g., SQL). IT-AIC-5.5
	6. Define dataset and Data Frame. IT-AIC-5.6
	7. Implement spreadsheet functions, formulas, conditional formatting, cell referencing, and pivot tables. IT-AIC-5.7
	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). IT-AIC-5.8
	9. Utilize visual reporting and statistical tools to define and understand statistics such as regression analysis, ANOVA, hypothesis testing, and sampling distributions. IT-AIC-5.9
Investigate and design potential solutions to social and ethical issues related to artificial intelligence. IT-AIC-6	1. Identify real examples of issues related to bias, perception, privacy, and accuracy in Artificial Intelligence. IT-AIC-6.1

	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). IT-AIC-6.2
	3. Using a web tool that trains a machine learning model without coding, investigate examples of bias and identify solutions. IT-AIC-6.3
	4. Identify and analyze examples of legal policies related to Artificial Intelligence, including why and how they were or are being developed. IT-AIC-6.4
	5. Analyze real world Artificial Intelligence scenarios to determine the ethical and legal implications. IT-AIC-6.5
	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. IT-AIC-6.6
Apply problem-solving skills to solve real-world problems. IT-AIC-7	1. Identify and investigate a real-world problem of interest that might be solved with Artificial Intelligence. IT-AIC-7.1
	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. IT-AIC-7.2
	3. Apply programming, logic, and data science to solve problems. IT-AIC-7.3
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. IT-AIC-8	1. Explain the goals, mission, and objectives of the career-technical student organization (CTSO). IT-AIC-8.1
	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. IT-AIC-8.2
	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. IT-AIC-8.3
	4. Explain how participation in career and technology education student organizations can promote lifelong responsibility for community service and professional development. IT-AIC-8.4
	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. IT-AIC-8.5