

## **INTRODUCTION TO ARTIFICIAL INTELLIGENCE**

### **COURSE CODE: 57M0**

**COURSE DESCRIPTION:** Artificial Intelligence involves simulating intelligent behavior in computers, encompassing programming, data science, mathematical reasoning, creative problem-solving, ethics, and practical experiences. With the increasing demand for AI skills, traditional careers like Data Analyst or Software Developer are evolving to incorporate AI solutions. The Foundations of Artificial Intelligence course introduces students to essential AI concepts, preparing them to comprehend common applications, tackle real-world challenges, and develop solutions using advanced technologies.

**OBJECTIVE:** Given the necessary equipment, software, supplies, and facilities, the student will be able to successfully complete the following core standards for courses that grant one unit of credit.

**PREREQUISITE:** Basic computer science course, Algebra 1 (or equivalent), and/ or teacher recommendation

**COMPUTER REQUIRED:** One computer per student

**CREDIT:** 1 unit (120 hours)

**RECOMMENDED GRADE LEVEL:** 9-10

### **IAI.A. COMPUTING SYSTEMS**

**Unit Description: CI solution designers and users understand the significance of various computing systems. The following accountability criteria are considered essential for students in the Artificial Intelligence program of study.**

**IAI.A1. Students will analyze the utilization of computing devices and investigate advancements in AI.**

IAI.A1.1. Identify and relate how hardware and software are used within given AI solutions.

IAI.A1.2. Troubleshoot common software problems that involve the interpretation of error messages and common system malfunctions.

IAI.A1.3. Compare concepts and uses of general artificial intelligence, deep learning, and machine learning.

**IAI.A.2. Students will solve relevant problems and design AI solutions using appropriate components, including software and hardware that contribute to computing devices.**

IAI.A2.1. Articulate the impact that computing devices and AI have in real-world settings (e.g. traffic lights, medical devices, facial recognition).

IAI.A2.2. Explain the difference between machine learning and human learning.

IAI.A2.3. Identify and define the function of circuits, sensors, microcontrollers, motors, and other components used within given AI solutions.

IAI.A2.4. Describe how hardware and software are used to generate a provided database.

## **IAI.B. DATA AND ANALYTICS**

**Unit Description: AI solution designers and users understand how data is collected, analyzed, stored, and used. The following accountability criteria are considered essential for students in the Artificial Intelligence program of study.**

**IAI.B1. Students will evaluate various data collection methods, data storage tools, data analysis tools and data representation tools.**

- IAI.B1.1 Define numeric, text, date, graphics, and sound types of data used in computing and AI solutions.
- IAI.B1.2 Compare the various data collection methods, data analysis tools, and data representation tools.
- IAI.B1.3 Explain how different collection methods and tools influence the amount and quality of the data that is observed and recorded.
- IAI.B1.4 Describe the various data storage tools and data organization methods related to generated lists and 2D arrays.
- IAI.B1.5 Distinguish between various methods of data representation (i.e., analog, digital, binary).
- IAI.B1.6 Analyze and visually represent static data.

**IAI.B2. Students will construct a computational model using large data sets.**

- IAI.B2.1. Summarize how data is used within excel and other statistical software programs.
- IAI.B2.2. Illustrate how data sets evolve when using iterative processing cycles (loops).
- IAI.B2.3. Compare the properties of a data set that could be used to explore a real-world (domain-specific) scenario or support a claim.
- IAI.B2.4. Describe and construct a simple model of the data processing cycle (input-processing-output).
- IAI.B2.5. Summarize a given set of data using common data analytics (e.g., mean, median and mode)
- IAI.B2.6. Identify and explain the difference between correlation and causality when analyzing data.

**IAIB3. Students will choose data types and data structures based on functionality, storage, and performance tradeoffs.**

- IAI.B3.1. Analyze the use of appropriate data types (e.g., lists, arrays and 2d arrays) in simple programs.

## **IAI.C. ALGORITHMS AND PROGRAMMING**

**Unit Description: AI solution designers and users understand how data is used in both algorithms and programming design. The following accountability criteria are considered essential for students in the Artificial Intelligence program of study.**

**IAI.C1. Students will create, evaluate, and modify algorithms to express an idea or solve a problem.**

- IAI.C1.1. Identify machine learning techniques (Algorithms) that allow the computer to learn behaviors without explicit programming.
- IAI.C1.2. Design, build and test level-appropriate algorithms that use iteration, selection, and sequence.
- IAI.C1.3. Illustrate the flow of execution of algorithms in level-appropriate programs including branching and looping.
- IAI.C1.4. Evaluate multiple student-created algorithms and non-student-created algorithms in terms of time and space complexities (e.g., linear and binary search options) iterations (time) with a finite list.
- IAI.C1.5. Detect and resolve errors in a given algorithm.

**IAI.C2. Students will divide a task into sets of functional units that can be reused to compose a complex solution.**

- IAI.C2.1. Decompose and explain tasks associated with given data sets (e.g., limited data libraries) into smaller, reusable parts to facilitate the design, implementation, and review of programs.

**IAI.C3. Students will plan, build, test, refine and document programs using text-based coding languages to solve problems with varying degrees of difficulty.**

- IAI.C3.1. Identify and use appropriate documentation methods while developing programs (e.g., inline comments, procedure header, purposeful naming).

**IAI.D. IMPACTS OF COMPUTING**

**Unit Description: AI solution designers and users understand the history and evolution of AI solutions, including both the benefits to society and global impact of their use. The following accountability criteria are considered essential for students in the Artificial Intelligence program of study.**

**IAI.D1. Students will research and analyze historical and current computing and AI applications, describing their global impact.**

- IAI.D1.1. Research advancing and emerging technologies (e.g., artificially intelligent agents, extended reality, Internet of Things (IoT), machine learning, robotics)
- IAI.D1.2. Research cutting-edge technologies that incorporate artificial intelligence and machine learning as a core component of its decision-making processes (e.g., autonomous vehicles, recommended purchase suggestions, speech recognition)
- IAI.D1.3. Define and illustrate examples of big data (e.g., information collected from social media or smartphone use), highlighting data privacy implications.
- IAI.D1.4. Discuss the advantages and disadvantages of advancing and emerging technologies over time (e.g., the impacts of artificial intelligence, virtual reality, and biometrics)

on productivity, job loss, inventions, quality of life, and globalization).

**IAI.D2. Students will evaluate the evolving legal and ethical tradeoffs that shape computing and AI practices.**

IAI.D2.1. Research and describe legal and ethical implications of computing and AI solutions.

IAI.D2.2. Identify ethical and legal implications of computing and AI solutions involving a variety of data (e.g., design based on good data vs bad data).

IAI.D2.3. Define and compare the ethical and legal implications of AI.

IAI.D2.4. Identify and analyze examples of legal policies related to computing and AI, including why and how they were or are being developed.

**IAI.E. PRIVACY AND SECURITY**

**Unit Description: AI solution designers and users understand security and privacy protocols associated with AI solutions and the importance of safeguarding data throughout its use. The following accountability criteria are considered essential for students in the Artificial Intelligence program of study.**

**IAI.E1. Students will research security and privacy protocols associated with AI and ML solutions and apply the protocols to protect the data throughout the processes.**

IAI.E1.1. Identify AI and ethics-related laws and analyze their effect on digital privacy, security, intellectual property, network access, contracts, and harassment.

IAI.E1.2. Discuss security and privacy issues that relate to AI applications.

IAI.E1.3. Explain the ethical methods of collecting data from human subjects while protecting privacy and security for use in training machine learning models.