



Course Description

CAI3821C | Computational Methods and Applications for Artificial Intelligence 1 | 3.00 credits

Computational data analysis is an essential part of artificial intelligence (AI). This course is designed to help students develop programming skills for AI applications. Students will learn core concepts of computational methods to solve data analysis problems, AI algorithmic methodologies, and how to test AI models. Prerequisites: CAI2100C, COP1047C, MAC1105, STA2023.

Course Competencies:

Competency 1: The student will demonstrate an understanding of the essential elements of computational theory for Artificial Intelligence by:

1. Describing the role of AI in everyday life
2. Understanding the importance of computational theory in AI
3. Describing the essential theoretical concepts and fields required in AI
4. Understanding the role of computational theory in the AI life cycle
5. Describing the importance of data literacy for AI

Competency 2: The student will demonstrate an understanding of Data Acquisition by:

1. Understanding the difference between raw data and information
2. Describing data ethics and its importance in data collection
3. Evaluating and categorizing data
4. Understanding the importance of feature engineering and its uses in AI

Competency 3: The student will demonstrate an understanding of Descriptive Analysis by:

1. Understanding descriptive analysis and its applications in AI
2. Performing data sampling
3. Understanding sampling bias and sampling error
4. Using data analysis to calculate and understand the measures of central tendency in a data set
5. Understanding measures of variability in the data
6. Applying the concepts of data variability and aggregate functions using a programming language such as Python, R, or MATLAB

Competency 4: The student will demonstrate an understanding of Inferential Analysis by:

1. Understanding inferential analysis and its applications in AI
2. Describing the difference between descriptive and inferential analysis
3. Describing the importance of inferential analysis in decision-making
4. Analyzing the characteristics of large populations using different sampling methods
5. Analyzing past and current data using a programming language such as Python, R, or MATLAB

Competency 5: The student will demonstrate an understanding of Data Visualization analysis by:

1. Describing data exploration and data visualization
2. Describing the importance of data visualization in AI
3. Describing the different types of data visualization analysis: Univariate, Bivariate, and Multivariate
4. Understanding different data visualization analysis techniques
5. Demonstrating and understanding data representation through dashboards and key performance indicators
6. Utilizing existing data visualization libraries in a language such as Python

Learning Outcomes:

- Communicate effectively using listening, speaking, reading, and writing skills
- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information
- Demonstrate knowledge of ethical thinking and its application to issues in society
- Use computer and emerging technologies effectively