NH Computer and Information Sciences, General. 

CIP#: 11.0101

# Data and Analysis

* Synthesize concepts, practices and processes of data collection, resource management, and techniques to different types of data in order to discover useful information that can communicate storytelling and to inform decision-making.

| **Skill/Knowledge** | **Applying**  **(4) Reasoning** | **Proficient**  **(3)** | **Developing**  **(2 - 1) Reasoning** | |
| --- | --- | --- | --- | --- |
| **Core Concepts**  I can demonstrate a comprehensive understanding of core computing concepts and effectively apply them in various contexts to optimize performance and efficiency. |  | * I can identify and implement strategies to improve system performance, such as caching, indexing, and algorithm optimization. * I can differentiate between big data and small data, and select appropriate techniques and tools for analysis based on dataset size and complexity. * I can articulate the importance of metadata in organizing and managing data across different domains beyond games or decks of cards. * I can manipulate and interpret data represented in binary, hex, and ASCII formats. |  | |
| **Data Structure (Relational Databases)**  I can design, implement, and manage relational databases effectively to store and retrieve data efficiently. |  | * I can design database schemas that reflect real-world relationships and constraints. * I can write SQL queries to perform complex data retrieval and manipulation operations. * I can optimize database performance through indexing, normalization, and denormalization techniques. * I can ensure data integrity and security through proper use of constraints and permissions. |  | |
| **Search, Sort, Clean Data**  I can execute search, sort, and data cleaning operations proficiently to prepare data for analysis and visualization. |  | * I can use search algorithms to efficiently locate specific data within datasets. * I can apply sorting algorithms to arrange data in a specified order. * I can clean and preprocess data by handling missing values, outliers, and inconsistencies. * I can validate and standardize data formats to ensure consistency and accuracy. |  | |
| **Visualization**  I can create effective data visualizations using tools like Excel and coding libraries to communicate insights and trends.. |  | * I can select appropriate chart types and visualization techniques to represent different types of data. * I can customize visualizations to highlight key findings and trends effectively. * I can use coding libraries and frameworks to generate interactive and dynamic visualizations. * I can interpret visualizations accurately and draw meaningful conclusions from the data presented. |  | |
| **Compression**  I can implement compression techniques effectively to reduce file sizes while preserving data integrity or accepting controlled loss. |  | * I can explain the differences between lossless and lossy compression methods. * I can select the appropriate compression algorithm based on the nature of the data and the desired level of compression. * I can implement compression algorithms to achieve optimal file size reduction without sacrificing essential data. * I can assess the trade-offs between compression ratio and data quality in different scenarios. |  | |