



Course Description

CIS2012C | Introduction to Data Analytics and AI for the Internet of Things | 4.00 credits

This course equips students with the knowledge and skills necessary to navigate the complex landscape of data analytics and artificial intelligence within the context of the Internet of Things (IoT), empowering them to contribute to the development of smart, data-driven IoT solutions. Prerequisites: CIS2010C, CIS2011C.

Course Competencies:

Competency 1: The student will demonstrate an understanding of IoT data fundamentals by:

1. Describing the types and characteristics of data generated by IoT devices and their relevance
2. Explaining the challenges associated with IoT data management
3. Discussing the importance of data security, privacy, and ethical considerations in IoT systems

Competency 2: The student will demonstrate the ability to collect and prepare IoT data for analysis by:

1. Identifying various methods for acquiring data from IoT devices, sensors, and networks
2. Applying techniques to clean and preprocess IoT data to make it suitable for analysis
3. Transforming IoT data to ensure compatibility with machine learning models, including normalization and feature engineering
4. Ensuring data integrity, security, and ethical handling during the collection and preprocessing stages

Competency 3: The student will demonstrate the ability to analyze IoT data by:

1. Applying basic statistical methods and data visualization techniques to identify patterns and trends in IoT datasets
2. Using analytical techniques to detect anomalies and insights that can inform AI-driven decision-making
3. Interpreting IoT data findings to support predictive analytics and real-time monitoring applications in IoT systems

Competency 4: The student will demonstrate an understanding of the application of AI techniques in IoT systems by:

1. Explaining foundational AI concepts, such as supervised and unsupervised learning, and their relevance to IoT systems
2. Describing how AI models are trained and applied to IoT data for tasks like anomaly detection, predictive maintenance, and energy optimization
3. Exploring practical examples of AI-driven IoT solutions, such as smart home systems, autonomous vehicles, and industrial IoT applications

Competency 5: The student will demonstrate the ability to implement basic IoT systems with AI capabilities by:

1. Assembling IoT devices and configuring them to collect data for AI analysis
2. Integrating sensors, actuators, and communication modules with AI algorithms to create functional IoT prototypes
3. Deploying pre-trained AI models on IoT devices for tasks such as classification, detection, or optimization
4. Troubleshooting IoT systems with AI components to ensure reliability and optimal performance

Competency 5: The student will demonstrate effective communication of IoT data insights and AI outcomes by:

1. Developing clear and concise reports that present findings from IoT data analyses and AI applications
2. Creating visualizations and dashboards that effectively communicate the outputs of AI models applied to IoT data
3. Articulating the implications of AI-driven insights for improving IoT system functionality and decision-making processes
4. Tailoring presentations and discussions to both technical and non-technical stakeholders

Competency 6: The student will demonstrate effective communication of IoT data insights and AI outcomes by:

1. Developing clear and concise reports that present findings from IoT data analyses and AI applications
2. Creating visualizations and dashboards that effectively communicate the outputs of AI models applied to IoT data
3. Articulating the implications of AI-driven insights for improving IoT system functionality and decision-making processes
4. Tailoring presentations and discussions to both technical and non-technical stakeholders

Competency 7: The student will demonstrate awareness of emerging trends and career opportunities in IoT and AI by:

1. Identifying current advancements in AI technologies that are transforming IoT systems, such as edge AI and federated learning
2. Discussing the integration of AI and IoT in addressing global challenges like climate monitoring, healthcare, and smart cities
3. Exploring professional certifications and skill pathways in AI and IoT to prepare for evolving industry demands
4. Reflecting on the future role of IoT technicians as AI becomes increasingly integrated into IoT systems

Learning Outcomes:

- Solve problems using critical and creative thinking and scientific reasoning
- Use quantitative analytical skills to evaluate and process numerical data
- Use computer and emerging technologies effectively