Miami Dade College

Course Description

CIS2011C | Introduction to Cloud Computing for Internet of Things | 4.00 credits

This course explores the intersection of cloud computing and the Internet of Things (IoT). Students learn how cloud platforms support storing, analyzing, and managing vast amounts of data created by IoT devices. From understanding cloud infrastructure to implementing IoT solutions using cloud services, the course provides practical insights into optimizing IoT performance using the power of cloud computing. Prerequisite: CEN2211.

Course Competencies:

Competency 1: The student will demonstrate an understanding of cloud computing fundamentals by:

1. Describing the basic concepts of cloud computing and its importance in modern technology
2. Identifying the essential characteristics of cloud services, including on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service
3. Explaining the differences between cloud service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)
4. Describing cloud deployment models such as public, private, hybrid, and community clouds

Competency 2: The student will demonstrate an understanding of the role of cloud computing in IoT by:

1. Explaining how cloud computing supports the storage, analysis, and management of data generated by IoT devices
2. Describing how IoT devices communicate with cloud services using protocols like MQTT and HTTP
3. Understanding the benefits of integrating IoT systems with cloud platforms, such as scalability and accessibility
4. Discussing challenges in integrating IoT with cloud services, including latency and bandwidth considerations

Competency 3: The student will demonstrate the ability to use cloud services for IoT applications by:

1. Setting up basic cloud services relevant to IoT, such as data storage and device management
2. Connecting IoT devices to cloud platforms using standard communication protocols
3. Managing IoT data in the cloud, including storage and retrieval
4. Utilizing cloud-based tools to monitor and control IoT devices remotely

Competency 4: The student will demonstrate an understanding of data management and analytics in cloud-based IoT systems by:

1. Explaining how IoT data is collected, transmitted, and stored in cloud environments
2. Explaining the differences between batch and real-time data processing in cloud environments and identifying when each approach is most appropriate for IoT applications
3. Demonstrating how to configure and use cloud-based streaming services to process and analyze IoT data as it is generated
4. Describing basic data processing and analytics capabilities provided by cloud platforms
5. Visualizing IoT data using cloud-based dashboards and reporting tools
6. Understanding data lifecycle management and the importance of data retention policies

Competency 5: The student will demonstrate an understanding of security and privacy in cloud-integrated IoT systems by:

1. Identifying common security threats and vulnerabilities in cloud-based IoT environments

2. Applying basic security measures such as encryption and authentication to protect data transmission between IoT devices and the cloud
3. Understanding the shared responsibility model in cloud security
4. Discussing privacy concerns related to storing IoT data in the cloud and basic compliance requirements

Competency 6: The student will demonstrate an understanding of cloud service models and their applications in IoT by:

1. Comparing and contrasting IaaS, PaaS, and SaaS models in the context of IoT deployments
2. Selecting appropriate cloud service models for specific IoT use cases
3. Describing examples of IoT applications using different cloud service models

Competency 7: The student will demonstrate an understanding of basic cloud deployment for IoT by:

1. Describing the steps involved in deploying an IoT application on a cloud platform
2. Understanding how to provision and configure cloud resources for IoT solutions
3. Explaining the role of virtual machines and containers in cloud-based IoT deployments

Competency 8: The student will demonstrate the ability to perform basic configuration and management of cloud-based IoT systems by:

1. Configuring cloud services to receive and process data from IoT devices
2. Managing connected IoT devices through cloud-based platforms, including device registration and updates
3. Monitoring IoT system performance and health using cloud tools
4. Troubleshooting common issues in cloud-integrated IoT systems

Competency 9: The student will demonstrate awareness of emerging trends in cloud computing for IoT by:

1. Discussing advancements in cloud technologies that impact IoT, such as serverless computing and microservices
2. Understanding the role of edge computing and its relationship with cloud computing in IoT applications
3. Exploring how advancements in network technologies like 5G enhance cloud-based IoT solutions
4. Identifying potential future developments in cloud computing relevant to IoT technicians

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