

COURSE SYLLABUS

CSC11006 – INTRODUCTION TO CLOUD COMPUTING

1. GENERAL INFORMATION

Course name:	Introduction to Cloud Computing
Course name (in Vietnamese):	Nhập môn Điện toán đám mây
Course ID:	CSC11006
Knowledge block:	Specialised
Number of credits:	4
Credit hours for theory:	30
Credit hours for practice:	45
Credit hours for self-study:	Unlimited
Prerequisite:	Introduction of Information Technology, Introduction of Programming, Computer Networking
Prior course:	Advanced Computer Networking.
Instructors:	

2. COURSE DESCRIPTION

This course provides a comprehensive introduction to cloud computing concepts, technologies, and applications. It equips students with the knowledge and skills to understand, utilize, and evaluate cloud-based solutions for various computing needs.

3. COURSE GOALS

At the end of the course, students are able to

ID	Description	Program LOs
G1	Define and explain the fundamental concepts of cloud computing.	1.3.4, 2.4.3, 2.4.5
G2	Explain the cloud architecture, including virtualization technologies and resource management techniques.	1.1.1, 1.1.2, 1.2.2, 1.3.2, 1.3.4, 1.4.13,

G3	Analyze the impact of cloud computing on software development and deployment	4.1.2, 4.3.4
G4	Employ core cloud services like storage, databases, and networking Discuss big data and analytics in the context of cloud platforms	1.3.4, 1.4.13
G5	Discuss key security and privacy considerations in cloud environments.	1.3.6, 1.4.13, 4.3.4
G6	Practice through hands-on labs using different cloud platforms.	5.1.1, 5.1.3, 5.2.1, 5.2.2, 5.3.1, 6.1.1, 6.2.2, 6.2.3

4. COURSE OUTCOMES

CO	Description	I/T/U
G1.1	Explain the characteristics of cloud computing, the concept of service models and deployment models of cloud computing Explain the key differences between on-premise, cloud-based, and hybrid approaches. Identify the benefits and challenges of cloud adoption	T
G1.2	Analyze and compare different cloud service models (IaaS, PaaS, SaaS) and deployment models (public, private, hybrid).	T,U
G1.3	Identify the security considerations for each cloud service model: Recognize the shared responsibility model in cloud security and understand the specific security concerns and best practices associated with each service model	T
G1.4	Identify the benefits and limitations of each cloud deployment model: Compare the agility, scalability, security, and cost considerations for public, private, and hybrid clouds.	T
G2.1	Explain the core components of cloud architecture (hypervisors, VMs, containers, storage, networks, orchestration) and their interactions.	T,U

G2.2	Explain how virtualization technologies (Type 1/2, Docker, Kubernetes) enable resource sharing, isolation, and dynamic scalability.	T,U
G2.3	Identify and resource management techniques (provisioning, allocation, load balancing, high availability) for optimal cloud utilization.	T
G3.1	Choose suitable virtualization tools, design basic cloud architecture diagrams, troubleshoot resource management issues, and analyze real-world cloud architecture case studies.	T,U
G3.2	Examine how cloud computing changes the landscape of software development, embracing continuous integration/continuous delivery (CI/CD), microservices architecture, and serverless functions	T,U
G3.3	Analyze the impact of cloud on deployment processes, including automation tools, infrastructure as code, and rapid scaling capabilities.	T,U
G3.4	Explain how cloud empowers collaborative development environments, remote access, and global software distribution, boosting team responsiveness and adaptability	T,U
G4.1	Classify different cloud storage options (object, block, file) - understand their characteristics, access methods, and best practices for data management and security.	T,U
G4.2	Explain cloud database offerings (NoSQL, relational) - compare their capabilities, understand deployment models, and explore scaling and optimization techniques.	T,U
G4.3	Apply designing and managing secure and scalable cloud networks - grasp core concepts like virtual private clouds (VPCs), network address translation (NAT), and security groups.	T,U
G4.4	Explain the advantages of using cloud platforms for big data processing and storage, analyzing scalability, cost-effectiveness, and access to distributed computing resources.	T,U
G5.1	Identify major cloud-based analytics services and tools for processing, analyzing, and visualizing big data (e.g., AWS Athena, Azure Data Lake Analytics, GCP BigQuery). Explain how cloud-based big data platforms enable data-driven decision making through real-time analytics, machine learning, and predictive modeling techniques.	T,U

G5.2	Identify and analyze key security challenges in cloud environments, including data breaches, access control, malware threats, and vendor lock-in. Understand best practices for implementing security measures like encryption, IAM, and network security controls	T,U
G5.3	Identify the complexities of data privacy considerations in cloud environments, including regulations like GDPR and CCPA, user data ownership, and potential privacy risks associated with data sharing and analytics. Formulate strategies for ensuring compliance and safeguarding user privacy rights	T,U
G6.1	Apply theoretical knowledge by actively creating and managing cloud infrastructures, including virtual machines, storage buckets, databases, and basic networking configurations.	T,U
G6.2	Use hands-on labs to troubleshoot cloud issues, test different services and features, and explore innovative solutions to real-world scenarios within various cloud platforms (e.g., AWS, Azure, GCP).	T,U

5. TEACHING PLAN

ID	Topic	Course outcomes	Teaching/Learning Activities (samples)	Assessments
1	<p>Introduction to Cloud Computing:</p> <ul style="list-style-type: none"> Definition and evolution of cloud computing Benefits and challenges of cloud adoption Cloud service models (IaaS, PaaS, SaaS) Deployment models (public, private, hybrid) Major cloud service providers (AWS, Azure, GCP, etc.) 	G1.1, G1.2	<p>Prepare:</p> <ul style="list-style-type: none"> Read materials <p>Activities:</p> <ul style="list-style-type: none"> Discussion 	Quiz1

	<ul style="list-style-type: none"> Case studies of cloud computing in various industries 			
2	<p>Cloud Architecture and Virtualization</p> <ul style="list-style-type: none"> Cloud infrastructure and components Virtualization technologies (hypervisors, VMs, containers) Resource management and orchestration High availability and scalability in the cloud Cloud monitoring and cost management 	G2.1, G2.2, G2.3, G3.1	<p>Activities:</p> <ul style="list-style-type: none"> Teaching Demo Discussion 	<p>Quiz 2</p> <p>Lab 1</p>
3	<p>Cloud Services and Applications</p> <ul style="list-style-type: none"> Cloud storage solutions (object storage, block storage, file storage) Cloud databases (NoSQL, relational databases) Cloud networking and virtual private clouds (VPCs) Serverless computing and containerization Cloud application development and deployment models Case studies of cloud-based applications 	G3.2, G3.3, G3.3, G3.4, G4.3	<p>Prepare:</p> <ul style="list-style-type: none"> <p>Activities:</p> <ul style="list-style-type: none"> Teaching Case study Demo Discussion 	<p>Quiz 3</p> <p>Lab 2</p> <p>Lab 4</p>

4	<p>Big Data and Analytics in the Cloud</p> <ul style="list-style-type: none"> • Introduction to big data concepts and challenges • Big data analytics platforms and services in the cloud • Cloud-based data warehousing and data lakes • Data visualization and machine learning in the cloud • Case studies of big data analytics in the cloud 	G4.1, G4.2, G4.4, G5.1	<p>Activities:</p> <ul style="list-style-type: none"> • Demo • Discussion 	<p>Quiz 4</p> <p>Lab 5</p>
5	<p>Cloud-Native Technologies and Microservices Architecture</p> <ul style="list-style-type: none"> • Cloud-Native Technologies Fundamentals • Microservices architecture: Benefits, challenges, and use cases. • Containerization and orchestration: Docker, Kubernetes. • Cloud-native ecosystem tools: Service Meshes (Istio), monitoring tools (Prometheus, Grafana). 	G2.1, G2.2, G2.3, G3.1	<ul style="list-style-type: none"> • 	
6	<p>Cloud Security and Privacy</p> <ul style="list-style-type: none"> • Security challenges and best practices in cloud environments 	G5.2, G5.3	<p>Activities:</p> <ul style="list-style-type: none"> • Demo • Discussion 	<p>Quiz 5</p> <p>Lab 3</p>

	<ul style="list-style-type: none"> • Identity and access management (IAM) • Data security and encryption • Network security and firewalls • Intrusion detection and prevention systems (IDS/IPS) • Cloud compliance and regulations • Privacy concerns and data residence 			
7	Review		Activities: <ul style="list-style-type: none"> • Discussion 	

6. ASSESSMENTS

ID	Topic	Description	Course outcomes	Ratio (%)
EX	Exercise			5%
EX1	Quiz 1	Cloud concept	G1.1, G1.2, G1.3, G1.4	
EX2	Quiz 2	Cloud architecture Public cloud services	G2.1, G2.2, G2.3, G3.1	
EX3	Quiz 3	Cloud Services and Applications	G3.2, G3.3, G3.4, G4.3	

EX4	Quiz 4	Big Data and Analytics in the Cloud	G4.1, G4.2, G4.4, G5.1	
EX5	Quiz 5	Cloud Security and Privacy Ethical Considerations of Cloud Computing	G5.2, G5.3	
	Project			40%
P1	Project 01	Build a Scalable Web Application on Cloud	G2.1, G2.2, G2.3, G3.1, G6.1	10%
P2	Project 02	Big Data Pipeline with Predictive Analytics / Cloud-Based Log Analytics and Business Intelligence System	G2.1, G2.2, G2.3, G3.1, G6.2	10%
P3	Project 03	Deploy and Manage a Scalable Cloud-Native E-Commerce Platform	G2.1, G2.2, G2.3, G3.1, G6.2	20%
Exam	Midterm Exam	Quiz		15%
	Final Exam	Quiz		40%

7. RESOURCES

Textbooks

- [1]. Jill West. (2020). *CompTIA Cloud+ Guide to Cloud Computing (MindTap Course List)* (1st ed.), Cengage Learning

- [2]. "Cloud Computing: A Practical Approach" by Anthony T. Veloso
[3]. "Cloud Computing: Principles and Paradigms" by Rajkumar Buyya, James Broberg, and Andrzej Goscinski

Tools

- [4]. VMWare
[5]. Kahoot
[6]. Public Clouds: AWS, Azure, Google Cloud

8. GENERAL REGULATIONS & POLICIES

- All students are responsible for reading and following strictly the regulations and policies of the school and university.
- Students who are absent for more than 3 theory sessions are not allowed to take the exams.
- For any kind of cheating and plagiarism, students will be graded 0 for the course. The incident is then submitted to the school and university for further review.
- Students are encouraged to form study groups to discuss the topics. However, individual work must be done and submitted on your own.
- Students prepare lessons, preview documents according to regulations
- Students need to actively interact in online discussion environments
- All online accounts must be registered by student email, using the student-ID and full name, the real avatar in online workspace.
- The number of assignments may vary depending on the classroom situation