NCAAA

T4

2020

Course Specifications

Course Title:	Elective-1 (Cloud Computing)
Course Code:	317 CNET-3
Program:	Bachelor in Computer and Network Engineering
Department:	Computer and Network Engineering
College:	Computer Science and Information Technology
Institution:	Jazan University

Table of Contents

A. Course Identification

1. Credit hours: 3	

2. Course type

a.   University ☐   College ☐   Department ☑   Others ☐

b.   Required ☐   Elective ☑

3. Level/year at which this course is offered: Level-11 / Year 04

4. Pre-requisites for this course (if any)**:** None

5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	52	100
2	**Blended**	--	--
3	**E-learning**	--	--
4	**Distance learning**	--	--
5	**Other**	--	--

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	22
2	**Laboratory/Studio**	22
3	**Tutorial**	--
4	**Others** (specify)	8
	Total	52

B. Course Objectives and Learning Outcomes

1. Course Description

Brief history of cloud computing, advantages, cloud characteristics and challenges of cloud computing are explained. Cloud delivery, cloud deployment models, roles and boundaries are discussed. Understanding of various architectural models of cloud computing, the concepts of virtualization and cloud orchestration. Fundamental cloud security concepts, security threats, attacks and cloud architectures are explained.

2. Course Main Objective

Upon successful completion of this course you should be able to:

1. Understand basic concepts related to Cloud Computing technologies

2. Explain different cloud delivery & deployment models.

3. Compare the operation, implementation and performance of Cloud Computing

Systems.

4. Apply Virtualization technology, Cloud storage, Data Management and Data Visualization.

5. Understand various fundamental cloud architectures, security implications in cloud computing.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	**Explain** the basic concepts, terminologies, strengths, and limitations of Cloud Computing.	K1
1.2	**Describe** various models, current developments in Cloud Computing.	K3
2	**Skills :**	
2.1	**Apply** virtualization technology, scaling and storage mechanisms using latest tools.	S2
2.2	**Analyze** the cloud security threats and its agents in cloud environment	S2
2.3	**Demonstrate** various cloud architectures and specialized cloud mechanisms.	S5
2.4	**Communicate** effectively in presentations to demonstrate their work.	S4
3	**Values:**	
3.1	**Perform** Self-study and self-assessment through assignments and case studies.	V2

C. Course Content

No	List of Topics	Contact Hours
1	**CHAPTER 1: Understanding Cloud Computing** **1.1 Origins and Influences** • Definitions • Technology Innovations • Clustering • Grid Computing Virtualization **1.2 Basic Concepts and Terminology** • Scaling • Horizontal scaling • Vertical Scaling **1.3 Goals and Benefits** • Reduced Investments and Proportional • Costs Increased Scalability • Increased Availability and Reliability **1.4 Risks and Challenges** • Increased Security Vulnerabilities • Reduced Operational Governance • Limited Portability Between Cloud Providers	6T+4P
2	**CHAPTER 2: Fundamental Concepts and Models** **2.1 Roles and Boundaries**	4T+4P

	• Cloud Provider • Cloud Consumer • Cloud Service Owner • Cloud Resource Administrator • Additional Roles • Organizational Boundary • Trust Boundary **2.2 Cloud Characteristics** • On-Demand Usage • Ubiquitous Access • Multitenancy • Elasticity • Measured Usage Resiliency **2.3 Cloud Delivery Models** • Infrastructure-as-service • Platform-as-a-Service • Software-as-a-Service **2.4 Cloud Deployment Models** • Public Clouds • Community Clouds • Private Clouds • Hybrid Clouds	
3	**CHAPTER 3: Cloud-Enabling Technology** **3.1 Data Center Technology** • Automation • Remote Operation Management • Data Center **3.2 Virtualization Technology** • Hardware Independence • Operating System-Based Virtualization • Hardware-Based Virtualization **3.2 Web Technology** • Basic Web Technology • Web Applications **3.3 Cloud Infrastructure Mechanisms** • Cloud usage Monitor Mechanisms • Monitoring agent • Resource agent • Polling agent	4T+4P
4	**CHAPTER 4: Fundamental Cloud Security** **4.1 Basic Terms and Concepts** • Confidentiality • Integrity • Authenticity • Availability • Threat • Vulnerability • Risk • Security Controls **4.2 Threat Agents** • Anonymous Attacker • Malicious Service Agent • Trusted Attacker • Malicious Insider **4.3 Cloud Security Threats** • Traffic Eavesdropping • Malicious Intermediary	4T+4P

	• Denial of Service		
5	**CHAPTER 5: Specialized Cloud Mechanisms and Cloud Architectures** **5.1 Cloud Mechanisms** • Automated Scaling Listener • Load Balancer • SLA Monitor • Pay-Per-Use Monitor • Failover System • Active-Active • Active-Passive • Hypervisor **5.2 Fundamental Cloud Architectures** • Workload Distribution Architecture • Resource Pooling Architecture • Dynamic Scalability Architecture		4T+6P
	Final Exam		4T+4P
Total			52

Online Study Topics :
• Cloud IT Resource • Cloud Consumers and Cloud Providers • Standardization and Modularity • Overlapping Trust Boundaries • Audit Monitor • Insufficient Authorization • Virtualization Attack

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	**Explain** the basic concepts, terminologies, strengths, and limitations of Cloud Computing.	➢ Lectures ➢ Classroom discussions ➢ Lab exercises.	➢ Assignment 1 ➢ Mid-Term Exam ➢ Final Exam
1.2	**Describe** various models, current developments in Cloud Computing.	➢ Lectures ➢ Classroom discussions ➢ Lab exercises.	➢ Assignment 1 ➢ Mid-Term Exam ➢ Final Exam
2.0	**Skills**		
2.1	**Apply** virtualization technology, scaling and storage mechanisms using latest tools.	➢ Lectures ➢ Classroom discussions ➢ Lab exercises	➢ Assignment 1 ➢ Mid-Term Exam ➢ Final Exam ➢ Lab Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	**Analyze** the cloud security threats and its agents in cloud environment	➢ Lectures ➢ Classroom discussions ➢ Lab exercises	➢ Assignment 2 ➢ Mid-Term Exam ➢ Final Exam ➢ Lab Exam
2.3	**Demonstrate** various cloud architectures and specialized cloud mechanisms.	➢ Lectures ➢ Classroom discussions ➢ Lab exercises	➢ Assignment 2 ➢ Mid-Term Exam ➢ Final Exam ➢ Lab Exam
2.4	**Communicate** effectively in their presentations to demonstrate their work.	➢ Classroom discussions ➢ Lab exercises	➢ Assignments ➢ Case study / Mini Projects
3.0	**Values**		
3.1	**Perform** Self-study and self-assessment through assignments and case studies.	➢ Classroom discussions ➢ Lab exercises	➢ Assignments ➢ Case study / Mini Projects

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments / Mini Project	4th Week	20%
2	Midterm Exam	6th Week	20%
3	Lab Exam	11th Week	20%
4	Final Theory Exam	12th Week	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Each student is assigned a faculty member for proper academic advising, counselling and support needed for the students appropriate and achievable outcomes.

Academic Advising Committee is responsible in allocating the faculty members (around 15 students) to each student and these faculty members play the role of an "Academic Advisor". Each Academic Advisor is expected to:

➢ Counsel students during the registration process based on their GPA
➢ Advise students with GPA less than 2.00
➢ Keep track and support the student academically with continuous process of improvement.
➢ focus on student's career perspectives based on their intellectual interests, identify better opportunities and connections in their academic fields.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1. Cloud Computing 2nd Edition by Daniel Kirsch and Judith Hurwitz, Published by: John Wiley & Sons, 2020, ISBN 978-1119546658.

	2. Cloud Computing: Concepts, Technology & Architecture ,Pearson Service Technology Series from Thomas Erl, 1st Edition, 2013, ISBN-13: 978-0133387520
Essential References Materials	1. Cloud Native Architectures, by Tom Laszewski, Kamal Arora, Erik Farr and Piyum Zonooz, 2018, ISBN 978-1787280540
Electronic Materials	- https://lms.jazanu.edu.sa/webapps/login/ (Blackboard) - www.tutorialspoint.com - www.cloudschool.com/courses
Other Learning Materials	--

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom equipped with projector and whiteboard and sufficient seating arrangements Lab with software installed and individual computer terminal for each student.
Technology Resources (AV, data show, Smart Board, software, etc.)	Whiteboards and projectors for classroom and lab Following software for lab work:
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Servers for demonstrating virtualization concepts are required

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Sufficiency of resources and facilities for students	Students	Course evaluation survey form
Effectiveness of teaching / learning process	Students	Course evaluation survey form
Effectiveness of teaching / learning process	HoD / QAU	Course reports / result analysis
Quality of learning Resources	Track leaders	Review meetings and star rating with suggestions for further modification and improvements
Verifying standards of student achievement / evaluation	HoD / committee nominated by HoD	Random re-checking of evaluated answer sheets
Achievement of course learning outcomes	Course Teachers and Course coordinator / HoD	CLO assessment template that is further verified at

Evaluation Areas/Issues	Evaluators	Evaluation Methods
		course coordinator and QAU level.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	DEPARTMENT COUNCIL
Reference No.	
Date	

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