Course Specification

(Bachelor)

Course Title:	Cloud Computing and Distributed Systems
Course Code:	314CCN-3
Program:	Bachelor of Science in Computer Networks
Department:	Networks and Communications Engineering
College:	Computer Science and Information Systems
Institution:	Najran University
Version:	1.0
Last Revision Date:	Feb 2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (.....)					
3 (2, 2, 1) [Theory, Lab, Tutorial]					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 6 / Year 3)					
4. Course general Description:					
Cloud is a model for distributed systems. Cloud computing has become the de facto platform on which enterprises are fueling digital transformations and modernizing IT portfolios. Today's Cloud systems are built using a common set of core techniques, design aspects, models, and algorithms – all centered on distributed systems. This course provides an in-depth understanding of fundamental clouds and distributed computing concepts, terminology underlying theory, and algorithms. The concepts and models covered in the course include virtualization, cloud and distributed networking, distributed algorithms, performance, scalability privacy and security. Upon completing this course, students will have intimate knowledge about cloud computing and the underlying theory of distributed systems concepts working inside clouds.					
5. Pre-requirements for this course (if any)**:**					
201CCN-4					
6. Co-requisites for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
This course aims to provide an in-depth understanding of distributed computing "concepts", distributed algorithms, and the techniques that underlie today's cloud computing technologies.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**75**	**100%**
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity		Contact Hours
1.	**Lectures**	[2 contact hours ´ 15 weeks]	30
2.	**Laboratory/Studio**	[2 contact hours ´ 15 weeks]	30
3.	**Field**		
4.	**Tutorial**	[1 contact hour ´ 15 weeks]	15
5.	**Others (specify)**		
Total			75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the basic concepts and terminologies of cloud computing and distributed systems	K1, K2	Lecture	Tests, Quizzes, and Assignments
...				
2.0	**Skills**			
2.1	Evaluate the performance and different issues of cloud computing and distributed systems	S4	Lecture, Lab	Tests, Quizzes, Assignments, and Lab
2.2	Explain various cloud and distributed systems paradigms	S6	Lecture, Lab	Tests, Quizzes, Assignments, and Lab

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	including virtualization, types, models; cloud services; architecture and platforms design; infrastructure, file and storage systems, operating systems; security and privacy			
2.3	Analyze the algorithms of cloud computing and distributed systems.	S1, S6	Lecture, Lab	Tests, Quizzes, Assignments, and Lab
2.4	Apply the knowledge and methods of cloud computing and distributed systems in programming.	S5	Lecture, Lab	Tests, Quizzes, Assignments, and Lab
...				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to cloud computing and distributed systems	5
2.	Cloud and distributed system types, services and model	5
3.	Cloud and distributed systems design platforms and architecture	5
4.	Virtualization and virtual machine	5
5.	Performance and benchmarks of cloud computing	5
6.	Performance issues of distributed systems	5
7.	Networks and protocol stacks, Client-server computing	5
8.	Inter process communication; Sockets and remote procedure call	5
9.	Cloud and distributed techniques and algorithms 1	5
10.	Cloud and distributed techniques and algorithms 2	5
11.	Cloud and distributed operating system	5
12.	Cloud data integrity and distributed file system	5

13.	Community clouds and ecosystems	5
14.	Security and privacy issues in cloud and distributed Systems	5
15.	Cloud and distributed systems programming	5
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	2,4,8,11	8%
2.	Assignments or mini project (presentation)	3,5,8,11	12%
3.	Midterm Examination	6th week	20%
4.	Lab Activities	1-14th week	10%
5.	Lab Final Examination	15th week	10%
6.	Final Examination	16th,17th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011 2. George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, Distributed Systems Concepts and Design, fifth edition, Addison Wesley
Supportive References	1. Distributed and Cloud Computing from Parallel Processing to the Internet of Things, Kai Hwang Jack Dongarra Geoffrey Fox; **ISBN:** 9780123858801, Morgan Kaufmann, October 2011 2. Andrew S. Tanenbaum, Maarten van Steen, Distributed Systems: Principles and Paradigms, second edition, Prentice Hall. 3. Graba, Jan, An Introduction to Network Programming with Java, second edition, Springer 4. Distributed Computing: Fundamentals, Simulations and Advanced Topics-Hagit Attiya and Jennifer Welch
Electronic Materials	Available in Blackboard

Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture Room and Laboratory
Technology equipment (projector, smart board, software)	Data show, PCs.
Other equipment (depending on the nature of the specialty)	Servers Lab

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, instructors and peer review	- Online course survey: By the end of each semester, students give their opinions about many factors in the course. They give feedback about teaching strategies, assessment methods, textbooks, instructors, etc. - Feedback about Course Learning Outcomes (CLOs): A course survey is distributed to students to get their opinions about the CLOs.
Effectiveness of students' assessment	Instructor, faculty, and student	- Discussion with other faculty members about students' understanding and the best way of teaching them. - Peer consultation on teaching - Discussions within the group of faculties teaching the same course before
Quality of learning resources	Instructor and Faculty	- Describe the relationship between the course's topics and CLOs. - Course syllabus must be distributed in the first week. It should contain the necessary information about the course (CLOs, assessment methods, descriptions, etc.) - Feedback from the students about the understanding of lectures in academic advising hours. - Analysis of the critical topics with real-life examples and preparation of good effective PPT slides. - By suggesting good teaching methodologies - Ensure that all students participate in the class.

Assessment Areas/Issues	Assessor	Assessment Methods
		- Encourage students to attend during office hours to clarify their doubts.
The extent to which CLOs have been achieved	Peer and instructor	- The course coordinator has to approve the exams and grades of students in exams. - The curriculum committee will review all courses by the end of each semester and approve actions and improvements plan to be carried out. - Getting feedback from the students who will pass the course and work in the practical field. - The vice dean and the dean of the college have to approve the final grades.
the planning arrangements for periodically reviewing course effectiveness and planning for improvement	Instructor	- Each semester, the instructor has to teach the course according to the previous course materials (Course specification, report, improvement plan, etc.). - By the end of each semester, the instructor must prepare a course file which contains all activities and practices taken in the course. Achievements of CLOs can be used if the students' levels improved or not

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	NETWORK AND COMMUNICATIONS ENGINEERING DEPARTMENT COUNCIL
REFERENCE NO.	**14450824-0482-00014**
DATE	**5/3/2024**