Course Specifications

Course Title:	**Cloud Computing**
Course Code:	**ICS 435**
Program:	**Information Technology (Cybersecurity)**
Department:	**Computer Science and Information**
College:	**Science at Al-Zulfi**
Institution:	**Majmaah**

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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 8
4. Pre-requisites for this course (if any)**: Distributed Systems - IT 421**
5. Co-requisites for this course (if any)**: Nil**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	44	80 %
2	**Blended**	3	5 %
3	**E-learning**	3	5 %
4	**Correspondence**	3	5 %
5	**Other**	3	5 %

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	30
2	**Laboratory/Studio**	20
3	**Tutorial**	5
4	**Others** (specify)	5
	Total	**60**
Other Learning Hours*		
1	**Study**	10
2	**Assignments**	20
3	**Library**	10
4	**Projects/Research Essays/Theses**	20
5	**Others** (specify)	0
	Total	**60**

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

This course provides a hands-on comprehensive study of Cloud concepts and capabilities across the various Cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Business Process as a Service (BPaaS). IaaS topics start with a detailed study the evolution of infrastructure migration approaches from VMWare/Xen/KVM virtualization, to adaptive virtualization, and Cloud Computing / on-demand resources provisioning. Mainstream Cloud infrastructure services and related vendor solutions are also covered in detail. PaaS topics cover a broad range of Cloud vendor platforms including AWS, Google App Engine, Microsoft Azure, Eucalyptus, OpenStack and others as well as a detailed study of related platform services such as storage services that leverage Google Storage, Amazon S3, Amazon Dynamo, or other services meant to provide Cloud resources management and monitoring capabilities. The SaaS and PaaS topics covered in the course will familiarize students with the use of vendor-maintained applications and processes available on the Cloud on a metered on-demand basis in multi-tenant environments.

The course also covers the Cloud security model and associated challenges and delves into the implementation and support of High Performance Computing and Big Data support capabilities on the Cloud. Through hands-on assignments and projects, students will learn how to configure and program IaaS services. They will also learn how to develop Cloud-based software applications on top of various Cloud platforms, how to integrate application-level services built on heterogeneous Cloud platforms, and how to leverage SaaS and BPaaS solutions to build comprehensive end-to-end business solutions on the Cloud.

2. Course Main Objective

1. To learn how to use Cloud Services.
2. To implement Virtualization.
3. To implement Task Scheduling algorithms.
4. Apply Map-Reduce concept to applications.
5. To build Private Cloud.
6. Broadly educate to know the impact of engineering on legal and societal issues involved.

3. Course Learning Outcomes

Upon successful completion, students will have the knowledge and skills to:

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	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	Understand the core concepts of the cloud computing paradigm: how and why this paradigm shift came about and the influence of several enabling technologies in cloud computing.	a1
1.2	Demonstrate the knowledge of architecture, service models, economics, scaling and recovering of cloud computing.	

CLOs		Aligned PLOs
1.3	Understand the technology infrastructure and network requirements for cloud computing.	a1
1.4	Understand the legal, ethical, and managerial requirements of cloud computing.	
2	**Skills :**	
2.1	Using Cloud Services applications.	b3
2.2	Using Cloud Services Platform	
2.3	Building Private Cloud schema	
2.4	Implementation Virtualization software	
3	**Competence: الكفاءات**	
3.1	Apply Map-Reduce concept to applications.	c1
3.2	Apply Web services bade cloud computing	
3.3	Apply Google application cloud	

C. Course Content

No	List of Topics	Contact Hours
1	Overview of Distributed Computing: Trends of computing, Introduction to distributed computing.	4
2	Introduction to Cloud Computing : What's cloud computing, Properties & Characteristics , Service models , Deployment models.	8
3	Infrastructure as a Service (IaaS) :Introduction to IaaS ,Resource Virtualization, Server ,Storage ,Network, Case studies.	8
4	Platform as a Service (PaaS) : Introduction to PaaS, Cloud platform & Management ,Computation ,Storage, Case studies.	8
5	Software as a Service (SaaS) : Introduction to SaaS, Web services Web 2.0, Web OS ,Case studies.	4
6	Cloud issues and challenges :Cloud provider Lock-in ,Security.	8
7	Overview of Map Reduce: What is Map Reduce, What is Map Reduce used for, implementation detail ,implication for the parallel development.	8
8	Introduction to Hadoop :Typical Hadoop Cluster , Challenges , Hadoop Components, example.	4
9	Hadoop Distributed File System :Big data and hand hop introduction, Hdfs introduction, Hdfs definition, Hfds architecture, understanding the file system, Read and write in Hdfs, Hdfs cl.	8
Total		60

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**		
1.1	Understand the core concepts of the cloud computing paradigm: how and why this paradigm shift came about	▪ **Direct Teaching:** Lectures,	- Homework tasks - Quiz - Midterms

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	and the influence of several enabling technologies in cloud computing.	PowerPoint slides and discussion. ▪ **Aimed Teaching** Discovery and Oral Questions.	- Final Exam
1.2	Demonstrate the knowledge of architecture, service models, economics, scaling and recovering of cloud computing.		
1.3	Understand the technology infrastructure and network requirements for cloud computing.		- E-learning - Internet search - Oral Exam
1.4	Understand the legal, ethical, and managerial requirements of cloud computing.		
2.0	**Skills**		
2.1	Using Cloud Services applications.	**Indirect Teaching:** Brainstorming - Free Discovery – Inquiry	- Lab Exercises - Lab Exam - Oral Exam - Presentations
2.2	Using Cloud Services Platform		
2.3	Building Private Cloud schema		
2.4	Implementation Virtualization software		
3.0	**Competence**		
3.1	Apply Map-Reduce concept to applications.	**Course Project: (Work group)** critical thinking and ability to seek solutions.	Introduce group project and case study approaches to enable students to have an experience in problem solving situations.
3.2	Apply Web services bade cloud computing		
3.3	Apply cloud Google applications		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework 1	2	2%
2	QUIZ 1	3	5%
3	Homework 2	4	2%
4	QUIZ 2	5	5%
5	Midterm 1	6	10%
6	Homework 3	7	2%
7	QUIZ 3	8	5%
8	Homework 4	9	2%
9	QUIZ 4	10	5%
10	Midterm 2	11	10%
11	Lab Exam/ Project Evaluation	14	12%
12	Final Exam	16	40%

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

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Determine meeting appointments for the weak' students to solve their problems and give them academic advices.
- One office hour daily
- Dealing a workshops.
- Motivate students

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	**Cloud Computing Explained**: Implementation Handbook for Enterprises, 2nd edition by John Rhoton (2013), Recursive Press, ISBN 0956355609
Essential References Materials	**The Tech Contracts Handbook:** Cloud Computing Agreements, Software Licenses, and Other IT Contracts for Lawyers and Businesspeople , by David W. Tollen , American Bar Association, 2016.
Electronic Materials	https://cloud.google.com/ https://aws.amazon.com/ar/free/ https://www.ibm.com/sa-en/services/cloud?
Other Learning Materials	Cloud services: https://www.informationvine.com/index?

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom - Laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show – Smart Board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Cloud Google App. Cloud Amazon App.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
1. Questionnaires (course evaluation) filled by the students and acquired electronically by the University	Students	Indirect Assessment
2. Students-faculty management meetings		

Evaluation Areas/Issues	Evaluators	Evaluation Methods
3. Midterms and Final Exam	Course Coordinator Staff	Direct Assessment
4. Project Evaluation		
5. Departmental internal review of the course.	Reviewer Committee	Final Exam Evaluation
6. Course Portfolio	External Reviewer	Course Evaluation

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	
Reference No.	
Date	