Course Specifications

Course Title:	Blockchain Technology
Course Code:	CSEC 423
Program:	Information and Computer Sciences
Department:	Computer Science and Information
College:	College of Science at Az Zulfi
Institution:	Majmaah University

Table of Contents

A. Course Identification

1. Credit hours:	**3 (2 Lec & 2 Lab)**
2. Course type	
a.	University ☐ College ☐ Department ☑ Others ☐
b.	Required ☑ Elective ☐
3. Level/year at which this course is offered:	**Optional**
4. Pre-requisites for this course (if any)**:**	CSEC 323
5. Co-requisites for this course (if any)**:**	NA

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	48	80 %
2	**Blended**	6	10 %
3	**E-learning**	6	10 %
4	**Correspondence**		
5	**Other**		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	30
2	**Laboratory/Studio**	20
3	**Tutorial**	10
4	**Others** (specify)	
	Total	60
Other Learning Hours*		
1	**Study**	20
2	**Assignments**	15
3	**Library**	10
4	**Projects/Research Essays/Theses**	5
5	**Others** (specify)	
	Total	50

* 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 aims to provide conceptual understanding of the function of Blockchain s as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable. It covers the technological underpinnings of Blockchain operations as distributed data structures and decision making systems, their functionality and different architecture types. It provides a critical evaluation of existing "smart contract" capabilities and platforms, and examines their future directions, opportunities, risks and challenges.

2. Course Main Objective

Having successfully completed this course, the student will be able to:

1. Acquire concepts of Blockchain systems and their applications.
2. Develop a deep appreciation of how Blockchain systems work.
3. Differentiate scenarios that cannot benefit from Blockchain technology.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge:**	
1.1	Understand the structure of a Blockchain and why/when it is better than a simple distributed database	K1
1.2	Analyze the incentive structure in a Blockchain based system and critically assess its functions, benefits and vulnerabilities	K2
1.3	Understand what constitutes a "smart" contract, what are its legal implications and what it can and cannot do, now and in the near future	K3
1...		
2	**Skills :**	
2.1	Evaluate the setting where a Blockchain based structure may be applied, its potential and its limitations	S1
2.2	Analyze to what extent smart and self-executing contracts can benefit automation, governance, transparency and the Internet of Things (IOT)	S2
3	**Competence:**	
3.1	Attain awareness of the new challenges that exist in monetizing businesses around Blockchain s and smart contracts	C1

C. Course Content

No	List of Topics	Contact Hours
1	Introduction: what is Blockchain , Blockchain -Based Applications, blockcahin Functionality, Blockchain non-functionality properties, Blockchain Architecture Design?	8
2	Existing Blockchain Platforms: Bitcoin, Ethereum, Hyperledeger Fabric and other cryptocurrencies.	8
3	Varieties of Blockchain s: Fundamentals Properties of Blockchain , Decentralization, Ledger Structure, Consensus Protocol, Block Configuration, Auxiliary Blockchain s, Anonymity, Incentives.	8
4	Blockchain in Software Architecture: Blockchain as an Architectural Element, Blockchain as Storage Element, Blockchain as Computational	8

	Element, Blockchain as communication Mechanism, Integrating Blockchain into a System as a Component.	
5	Design Process for Applications on Blockchain : Evaluation of suitability, Example Use Cases for Suitability Evaluation, Design process for Blockchain -based systems.	8
6	Performance: Performance Characteristics of Blockchain , Architectural Performance Modeling, Predicting Latency for Blockchain -Based Systems, Architectural Decision-Making.	8
7	Dependability and Security: Confidentiality, Integrity, Safety, Maintainability, Availability and Reliability.	8
Total		56

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 structure of a Blockchain and why/when it is better than a simple distributed database	Lectures, Lab demonstrations Case studies Individual presentations	Written Exam Homework assignments Class & lab Activities Quizzes
1.2	Analyze the incentive structure in a Blockchain based system and critically assess its functions, benefits and vulnerabilities	Lectures, Lab demonstrations Case studies Individual presentations	Written Exam Homework assignments Class & lab Activities Quizzes
2.0	**Skills**		
2.1	Evaluate the setting where a Blockchain based structure may be applied, its potential and its limitations	Group discussions, Lab demonstrations, Brainstorming Presentations	Home works and assignments
2.2	Analyze to what extent smart and self-executing contracts can benefit automation, governance, transparency and the Internet of Things (IOT)	Group discussions, Lab demonstrations, Brainstorming Presentations	Home works and assignments
3.0	**Competence**		
3.1	Attain awareness of the new challenges that exist in monetizing businesses around Blockchain s and smart contracts	Group discussions, Lab demonstrations, Brainstorming Presentations	Home works and assignments

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First written mid-term exam	6	10%
2	Second written mid-term exam	12	10%
3	Presentation, class activities, and group discussion	Every week	10%
4	Homework assignments	After Every chapter	10%
5	Practical exam	15	20%
6	Final exam	16	40%
7	Total		100%
8			

***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 :

Office hours: Sun: 1-3, Mon. 12-1, Wed. 12-1
Office call: Sun. 12-1 and Wed 9-10

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Architecture for Blockchain Applications. X. Xu, I. Weber, and M. Staples. Springer 2019
Essential References Materials	The Basics of Bitcoins and Blockchain s. Antony Lewis. Mango. 2018
Electronic Materials	https://www.coursera.org/
Other Learning Materials	Video and presentations will be available with the instructor

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms and Laboratories are available at the college of science at Al-Zulfi.
Technology Resources	Smart Boards, software, data shows and AV technological resources are available.

Item	Resources
(AV, data show, Smart Board, software, etc.)	
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	N/A

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course evaluation	Student-faculty management meeting	Questionnaires
Evaluation of Teaching	Program/Department Instructor	Discussion within the staff members teaching the course Departmental internal review of the course.

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	