



Course Specifications

Year 1 – Level 1

Course Title:	English Language 1
Course Code:	ELCE1201
Program:	Bachelor in EMI Colleges (Medical Colleges/ College of Engineering/ College of Computer Sciences/ College of Business Administration/ Applied Sciences)
Department:	English Language Centre
College:	English Language Centre
Institution:	Umm Al Qura University

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A. Course Identification

1. Credit hours: 4 hours
2. Course type a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 1 st Year
4. Pre-requisites for this course (if any): N/A
5. Co-requisites for this course (if any): N/A

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	12 hours per week	75%
2	Blended	16 hours per week	100%
3	E-learning	4 hours per week	25%
4	Distance learning	0	0
5	Other	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	(16 hours) X (10 weeks)
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	160 hours

B. Course Objectives and Learning Outcomes

1. Course Description

English Language I is a single-level, English for General Purposes (EGP) course. All students who are admitted to Bachelor in the EMI Colleges (Medical Colleges/ College of Engineering/ College of Computer Sciences/ College of Business Administration/ Applied Sciences) are required to take this course in the first semester of the first year of their program. The course is offered in 10 weeks with a 16-hour-per week teaching plan covering the four language skills. It intends to develop students' knowledge and ability of English language in all major skills which include reading, writing, listening, and speaking, as well as in sub-skills including grammar, vocabulary, and pronunciation.

2. Course Main Objective

English Language 1 is a basic level taking students from (CEFR) A1 to A2.

3. Course Learning Outcomes

CLOs	
1.0	Knowledge
1.1	<p>By the end of the course, the students are expected to be able to:</p> <p>exhibit adequate comprehension of spoken materials at the A2 level through recognizing key words and simple changes in topic.</p> <ul style="list-style-type: none"> - understand the main ideas of conversations, presentations, radio programmes, news reports, podcasts, and interviews - understand how to listen for detail in academic study - understand the use of repetition for clarification - understand a speaker's mood from intonation - understand a speaker's attitude to a topic - distinguish fact from opinion - recognize features of connected speech, e.g. single sounds, intrusives, stress patterns
1.2	<p>demonstrate basic understanding of grammar at the A2 level.</p> <ul style="list-style-type: none"> - use the present simple to describe habits and routines - be aware of the use of formal vs informal language when making requests, writing email, etc. - use the past simple and past continuous when describing events in someone's life with correct time clauses where needed - use the present continuous to describe actions happening at the time of speaking or when discussing future plans - use <i>going to</i> when talking about persona plans or intentions - correctly use quantifiers, such as <i>too much</i> - be aware of the difference in use of <i>to</i> and <i>for</i> when giving reasons - use comparatives and superlatives for comparing people and objects - make predictions using <i>will</i>, <i>may</i> or <i>might</i> where appropriate - use present perfect to talk about experience or ack of it - use relative clauses with <i>who</i>, <i>which</i> or <i>that</i>
1.3	<p>recognize and use lexical items such as words, collocations related to everyday topics at the A2 level:</p> <ul style="list-style-type: none"> - develop vocabulary of the topics covered in order to be able to talk about them with others - be able to combine clauses using <i>and</i> and <i>but</i> - understand and use basic collocations with <i>have</i>, <i>make</i> and <i>do</i> - write short texts, eg making comments on podcast chat or online discussions, or giving online travel advice
2.0	Skills
2.1	Cognitive Skills:
2.1.1	<p>demonstrate comprehension of simple written texts at the A2 level through applying the skills of scanning, skimming, and guessing from context.</p> <ul style="list-style-type: none"> - develop scanning (to find information quickly) and skimming skills (to predict the meaning of the text from visuals, titles or common words) - identify the author or speaker's audience and purpose - listen or read for opinions, attitude, and identify fact from opinion - understand meaning from context in both written and spoken texts
2.1.2	<p>compose simple and basic texts at the A2 level about everyday topics through applying the skills of brainstorming ideas, composing an outline, and editing/revision.</p> <ul style="list-style-type: none"> - write a formal email of introduction - post comments online with reasons and/ or examples - posting text msgs vs writing an email - brainstorm and write points on presentation slides with correct format (parallelism) - write an announcement and comment on it - research a famous person, make notes, and produce a short paragraph from them - write a vlog script - write combined sentences, using <i>and</i> and <i>but</i> - use sequencers: <i>first</i>, <i>then</i>, <i>next</i>, <i>etc</i> - punctuation: Capital letters, commas, periods.

CLOs	
2.1.3	<p>communicate in spoken language at the A2 level through simple tasks such as direct exchange of information, delivering short talks</p> <ul style="list-style-type: none"> - talk about familiar topics - use functional language, such as greetings, inviting, expressing surprise, etc - give short presentations - produce a short vlog and video - check understanding
2.2	<p>Critical Thinking</p> <ul style="list-style-type: none"> - consider how people feel and think when meeting someone for the first time - analyze a text regarding main ideas in paragraphs - identify and discuss the habits of successful people - identify the pros and cons of a topic - identify a person's attitude or feelings based on what they have said - identify solutions to a problem - identify the purpose of a text based on its content - form an opinion based on input, eg an article - separate fact from fiction - identify reasons people take some action and problems they may have - evaluate a classmate's writing based on criteria provided - identify the difference between fact and fiction in advertisements - identify different points of view - identify use of register/ formality - reflect on how knowledge helps comprehension - reflect on knowledge gained - make predictions based on present knowledge
2.3	<p>Communication, Information Technology, Numerical</p> <ul style="list-style-type: none"> - provide basic, prepared information - describe and give personal opinions on a variety of topics - give advice, eg on travel - express general beliefs - talk about advantages and disadvantages - give recommendations - present persuasively
2.4	<p>Psychomotor</p> <ul style="list-style-type: none"> - give confident, persuasive presentations - design slides for a presentation with appropriate parallelism - use linking and weak forms in sentences
3.0	Values
3.1	develop life-long learning strategies so that students can take full responsibility of their English language skill development.
3.2	develop academic integrity.
3.3	<p>collaborate in knowledge building and co-operate with peers:</p> <ul style="list-style-type: none"> - hold short discussions with a partner to activate knowledge before listening tasks - hold short discussions with a partner to synthesize knowledge post-listening - work with others to develop a plan, create a convincing argument - give feedback to peers on writing, presentations, etc - use intonation to show emotion and interest - show levels of agreement "I agree", "I guess" - ask for opinions and check information
3.4	<p>take the responsibilities to meet the requirements of the jobs market:</p> <ul style="list-style-type: none"> - consider research needed before a job application - write a formal letter of self-introduction - be aware of the importance of first impressions - consider and give advice on how to save - consider the future of work

C. Course Content

No	List of Topics	Contact Hours
Evolve 2 Special Edition: Level 1 (A2)		
1	Unit 1: Connections Family, possessions, greetings, email, first impressions, things in common Video: Friends for dinner	
2	Unit 2: Work and Study Routines, work or study space, explaining a problem, podcasts, smartphones, the Internet, useful apps Video: Monday morning problems	
3	Unit 3: Let's move Sport and exercise, asking for info, bike sharing, attitudes to keeping fit, a fitness program Video: At the gym	
4	Unit 4: Good times Comic Con, gifts, invitations, Bug Fest, National Day and national dishes Video: A surprise party	
5	Unit 5: Firsts and lasts A day in your life, events in your life, congratulating and sympathizing, first impressions, migration, the Titanic Video: A photo album	
6	Unit 6: Buy now, pay later Back Friday, shopping habits, discovering new words, money, online shopping advice, inventions Video: An online shopping problem	
7	Unit 7: But first, food Comfort food, street food, ordering, meat-free burgers, vegan food, celebrating Video: Eating out	
8	Unit 8: Trips Trip advice, A short trip, making suggestions, living abroad, a trip to Riyadh, planning a trip Video: Lost in the city	
9	Unit 9: Looking good What to wear, family photos, giving opinions, images in ads, recycling, advertisements Video: An untidy guest	
10	Unit 10: Risky business Dangers at work, health, fears, the future: yourself and work, TV shows Video: A 911 call	
11	Unit 11: Me, online Personal achievements, social media, requesting, selfies, Internet of Things (IoT), online videos Video: Getting a job	
12	Unit 12: Outdoors The weather, describing places, getting lost, guerilla gardening, writing a trip review, a tourism campaign Video: Changes	
Total		

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	<p>By the end of the course, the students are expected to be able to:</p> <p>exhibit adequate comprehension of spoken materials at the A2 level.</p> <ul style="list-style-type: none"> - understand the main ideas of conversations, presentations, radio programmes, news reports, podcasts, and interviews - understand how to listen for detail in academic study - understand the use of repetition for clarification - understand a speaker's mood from intonation - understand a speaker's attitude to a topic - distinguish fact from opinion - recognize features of connected speech, e.g. single sounds, intrusives, stress patterns 	Listening exercises	<p>Listening mid-term exam</p> <p>Listening final exam</p>
1.2	<p>demonstrate basic understanding of grammar at the A2 level.</p> <ul style="list-style-type: none"> - use the present simple to describe habits and routines - be aware of the use of formal vs informal language when making requests, writing email, etc - use the past simple and past continuous when describing events in someone's life with correct time clauses where needed - use the present continuous to describe actions happening at the time of speaking or when discussing future plans - use <i>going to</i> when talking about personal plans or intentions - correctly use quantifiers, such as <i>too much</i> - be aware of the difference in use of <i>to</i> and <i>for</i> when giving reasons - use comparatives and superlatives for comparing people and objects - make predictions using <i>will</i>, <i>may</i> or <i>might</i> where appropriate - use present perfect to talk about experience or acknowledge it - use relative clauses with <i>who</i>, <i>which</i> or <i>that</i> 	Grammar exercises	<p>Midterm Exam</p> <p>Continuous writing assessment</p> <p>Continuous speaking assessment</p> <p>Quizzes</p> <p>Writing Final Exam</p> <p>Final Exam</p>
1.3	<p>recognize and use lexical items such as words, collocations related to everyday topics at the A2 level:</p> <ul style="list-style-type: none"> - develop vocabulary of the topics covered in order to be able to talk about them with others - be able to combine clauses using <i>and</i> and <i>but</i> - understand and use basic collocations with <i>have</i>, <i>make</i> and <i>do</i> - write short texts, e.g. making comments on podcast chat or online discussions, or giving online travel advice 	Writing, reading, and vocabulary exercises	<p>Midterm Exam</p> <p>Continuous writing assessment</p> <p>Continuous speaking assessment</p> <p>Quizzes</p> <p>Writing Final Exam</p> <p>Final Exam</p>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	Skills		
2.1	Cognitive Skills:		
2.1.1	demonstrate comprehension of simple written texts at the A2 level through applying the skills of scanning, skimming, and guessing from context. <ul style="list-style-type: none"> - develop scanning (to find information quickly) and skimming skills (to predict the meaning of the text from visuals, titles or common words) - identify the author or speaker's audience and purpose - listen or read for opinions, attitude, and identify fact from opinion - understand meaning from context in both written and spoken texts 	Reading comprehension exercises	Classroom discussion Midterm exam Final exam
2.1.2	compose simple and basic texts at the A2 level about everyday topics through applying the skills of brainstorming ideas, composing an outline, and editing/revision. <ul style="list-style-type: none"> - write a formal email of introduction - post comments online with reasons and/ or examples - posting text msgs vs writing an email - brainstorm and write points on presentation slides with correct format (parallelism) - write an announcement and comment on it - research a famous person, make notes, and produce a short paragraph from them - write a vlog script - write combined sentences, using <i>and</i> and <i>but</i> - use sequencers: <i>first, then, next, etc</i> - punctuation: Capital letters, commas, periods. 	Writing exercises	Continuous writing assessment Writing Final Exam
2.1.3	communicate in spoken language at the A2 level through simple tasks such as direct exchange of information, delivering short talks <ul style="list-style-type: none"> - talk about familiar topics - use functional language, such as greetings, inviting, expressing surprise, etc - give short presentations - produce a short vlog and video - check understanding 	Speaking exercises Discussion Presentation, eg an advertisement, a tourist campaign, a YouTube video	Continuous speaking assessment

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	<p>Critical Thinking</p> <ul style="list-style-type: none"> - consider how people feel and think when meeting someone for the first time - analyze a text regarding main ideas in paragraphs - identify and discuss the habits of successful people - identify the pros and cons of a topic - identify a person's attitude or feelings based on what they have said - identify solutions to a problem - identify the purpose of a text based on its content - form an opinion based on input, eg an article separate fact from fiction - identify reasons people take some action and problems they may have - evaluate a classmate's writing based on criteria provided - identify the difference between fact and fiction in advertisements - identify different points of view - identify use of register/ formality - reflect on how knowledge helps comprehension - reflect on knowledge gained - make predictions based on present knowledge 		
2.3	<p>Communication, Information Technology, Numerical</p> <ul style="list-style-type: none"> - provide basic, prepared information - describe and give personal opinions on a variety of topics - give advice, eg on travel - express general beliefs - talk about advantages and disadvantages - give recommendations present persuasively 	<p>Demonstrations Active self-learning Pair work Group work e-learning Online material (Encourage students to make their presentations to small groups in the class)</p>	<p>Monitoring students' progress</p> <p>Evaluating the individual contribution</p> <p>Evaluating the teamwork</p> <p>Evaluating the final product (Evaluation of presentations may be by peers)</p>
2.4	<p>Psychomotor</p> <ul style="list-style-type: none"> - give confident, persuasive presentations - design slides for a presentation with appropriate parallelism - use linking and weak forms in sentences 	<p>Active self-learning Pair work Group work</p>	<p>Monitoring students' progress</p>

3.0	Values		
3.1	develop life-long learning strategies so that students can take full responsibility of their English language skill development.	Cambridge application Cambridge LMS	Built-in immediate feedback
3.2	develop academic integrity.	Writing exercises	Continuous writing assessment Continuous speaking assessment Writing Final Exam
3.3	collaborate in knowledge building and co-operate with peers: - hold short discussions with a partner to activate knowledge before listening tasks - hold short discussions with a partner to synthesize knowledge post-listening - work with others to develop a plan, create a convincing argument - give feedback to peers on writing, presentations, etc - use intonation to show emotion and interest - show levels of agreement “ <i>I agree</i> ”, “ <i>I guess</i> ” - ask for opinions and check information	Peer work Group work	Evaluating the individual contribution Evaluating the teamwork Evaluating the final product
3.4	take the responsibilities to meet the requirements of the jobs market: - consider research needed before a job application - write a formal letter of self-introduction - be aware of the importance of first impressions - consider and give advice on how to save - consider the future of work	Individual, peer and group work inside classrooms. Extramural language work to master the competencies at this language level.	Monitoring students’ progress

2. Assessment Tasks for Students

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

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Exam	The 5 th	30
2	Listening Mid-term Exam	The 6 th	5
3	Continuous writing assessment	from the 1 st to the 10 th	5
4	Continuous speaking assessment	from the 1 st to the 10 th	5
5	3 Quizzes (average)	3 rd / 6 th / 9 th	5
6	Online Practice	from the 1 st to the 10 th	5
6	Listening Final Exam	The 10 th	5
7	Writing Final Exam	The 11 th	5
8	Final Exam	The 11 th	35
	Total		100

E. Student Academic Counseling and Support

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

Course instructors are ready to answer all students' queries during their lectures or during office hours and they can be reached by personal meeting, e-mails, WhatsApp or telegram.

All students have the e-mail and office hours of the course instructor through student handouts distributed to the student at the beginning of each semester.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Clandfield, L., Goldstein, B., Jones, C., Kerr, P., Hendra, L., Tilbury, A. (2019). Evolve 2 Special Edition: Student's Book with Practice Extra. Cambridge University Press. UK: Cambridge University Press.
Essential References Materials	Multimedia
Electronic Materials	Cambridge LMS
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	data show, Smart Board, and Cambridge application
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Blackboard

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources.	Faculty members	Direct: Course reports
Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources.	University students	Direct: Evaluation surveys

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 Committee
Reference No.	
Date	May 30.2022

Course Title:	Computational Thinking & Problem Solving
Course Code:	SE1101
Program:	Bachelor of Data Science
Department:	Information Systems
College:	Computers and Information Systems
Institution:	Umm Al Qura University

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H. Specification Approval Data	20

A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 1 / 1st year
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	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces students to computational thinking and problem-solving fundamental skills of 21st century. Mainly, it introduces computational thinking as an approach to problem-solving. It emphasizes the basic concepts of computational thinking such as logical thinking algorithmic thinking, decomposition, generalization, and modelling and helps students to build up a solid understanding of them by exposing them to a large series of problems. Moreover, the course introduces students to practice computational thinking through programming solutions for a variety of real-world problems to build and develop students' problem-solving skills.

2. Course Main Objective

This course teaches students the most important concepts, computational thinking methods, and techniques to solve real-world problems and practice their implementation through programming.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Recognize the concepts of computational thinking.	K1
1.2	Explain computational thinking techniques and strategies to solve problems	K1
2	Skills :	
2.1	Apply computational thinking to solve problem using python	S2
2.2	Analyze problems using computational thinking strategies	S1
2.3	Design models to solve real world problems.	S2
2.4	Evaluate implemented solutions	S2
3	Values:	
3.1	Engage in lifelong learning.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to computational thinking	4
2	Logical and algorithmic thinking	4
3	Problem solving and decomposition	4
4	Abstraction and modeling	4
5	Dealing with errors and evaluating a solution	4
6	Python basics	4
7	Effective building blocks and organizing the code	4
8	Using abstractions and patterns for effective modeling	4
9	Testing and evaluating programs	4
10	Guided example	4
Total		40

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	Recognize the concepts of computational thinking.	Coop learning Lectures	Exams Rubrics
1.2	Explain computational thinking techniques and strategies in software development	Problem sets Puzzles	Course Exit Survey
2.0	Skills		
2.1	Apply computational thinking to solve problem using python	Coop learning Lectures	Quizzes and/or Online Quizzes,
2.2	Analyze problems using computational thinking strategies	Group Discussion Brainstorming	Midterm, Final Exam
2.3	Design models to solve real world problems.	Exercises set Lab problems set	Rubrics Course Exit Survey

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.4	Evaluate implemented solutions		
3.0	Values		
3.1	Engage in lifelong learning.	Self-learning field Lab work	Lab Exams Course Exit Survey

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Problem sets	Bi-Monthly	15%
2	Online Quizzes	Monthly	15%
3	Midterm Exam	6	20%
4	Final Lab Exam	10	20%
5	Final exam	12	30%

*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 :

All faculty members are expected to include three weekly office hours. These office hours are displayed in each faculty's schedule and communicated to students.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	COMPUTATIONAL THINKING A beginner's guide to problem solving and programming, Karl Beecher. © BCS Learning & Development Ltd 2017. https://www.amazon.com/Computational-Thinking-beginners-problem-solving-programming-ebook/dp/B072MGKS96
Essential References Materials	Puzzle-based Learning: Introduction to critical thinking, mathematics, and problem solving. Matthew Michalewicz, http://www.amazon.com/Puzzle-based-Learning-Introduction-critical-mathematics/dp/1876462639/ref=sr_1_1?ie=UTF8&s=books&qid=1212262753&sr=1-1
Electronic Materials	Umm Al Qura e-learning system containing teaching resources (Slides, assignment papers, etc.)
Other Learning Materials	Lab on computer systems (Python/Flowgorithm)

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room with: * at least 30 seats

Item	Resources
	* A data show projector connected to a PC preferably with Internet connection * sliding board PC Lab (at least 20 seats)
Technology Resources (AV, data show, Smart Board, software, etc.)	20 Windows PCs with Python/Flowgorithm installed
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student's feedback: instructor effectiveness in teaching and teaching methods. Effectiveness of support materials.	students	Anonymous surveys
Peer evaluation: course design and content.	peers	Peer review
Self-evaluation: course design and content, teaching methods, assessment methods.	instructor	Self-review report

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	30 May 2022

Course Title:	Introduction to Calculus
Course Code:	MTH1105
Program:	Bachelor of Data Science
Department:	Mathematical sciences
College:	Applied sciences
Institution:	Umm Al Qura University

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A. Course Identification

1. Credit hours: 4
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 1/ 1st year
4. Pre-requisites for this course (if any): None
5. Co-requisites for this course (if any): Not applicable

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	Four hours/week	100%
2	Blended	0	0
3	E-learning	0	0
4	Distance learning	0	0
5	Other	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	36
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (Exam, Quizzes, Activities,...)	6
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This introductory calculus course covers differentiation and integration of functions of one variable. It is the first in a three-course sequence of calculus. Key topics of the course include precalculus, limits and continuity, derivatives, integrals.

2. Course Main Objective

The primary objective of the course is to introduce students to the concepts of calculus and to develop the student's confidence and skill in dealing with mathematical expressions. To achieve this goal, the course will help the student understand the following basic concepts: limits, continuity, derivatives and integration involving real-valued functions of one variable (including algebraic and trigonometric functions).

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	Knowledge and Understanding: by the end of this course, the student is expected to be able to	

CLOs		Aligned PLOs
1.1	Recognize the characteristics of a function expressed in symbolic or graphic form.	K1
1.2	Outline the definitions of limits and continuity of a single-variable function and related theorems.	K1
1.3	Define the basic concept of a derivative of a single-variable function and learn the different rules, formulas and theorems for computing the derivative of a function in calculus.	K1
1.4	Define the basic concepts and techniques of integration of polynomial, rational, and trigonometric functions.	K1
2	Skills: by the end of this course, the student is expected to be able to	
2.1	Analyze functions represented in a variety of ways: graphical, numerical or analytical	S1
2.2	Determine the limits of functions and their continuity at points or on intervals.	
2.3	Calculate the derivative of various type of functions using the rules and techniques of differentiation.	
2.4	Evaluate integrals of real functions using basic rules and techniques of integration.	
3	Values: by the end of this course, the student is expected to be able to	
3.1	Apply the computational and conceptual principles of calculus to the solutions of various mathematical problems.	
3.2	Justify the choice of different steps in problem resolution procedure.	
3.3	Solve problems using a range of formats and approaches in basic science.	
3.4	Show the ability to work independently and within groups.	V1

C. Course Content

No	List of Topics	Contact Hours
1	<u>Pre Calculus:</u> (i) Exponents and Radicals. (ii) Solving Equations. (iii) Inequalities and Absolute Values. (iv) Lines	8
2	<u>Functions</u> (i) Functions: Definition, Graphs and Operations (ii) Trigonometric Functions and Identities.	4
3	<u>Limits and Continuity:</u> (i) Introduction to Limits	8

	(ii) Theorems on limits (iii) Limit at infinity and infinite limits (iv) Continuity	
4	<u>Differentiation</u> (i) Definition of Derivative (Using Limits) (ii) Rules and Theorems for Finding Derivatives (iii) Derivative of Trigonometric Function (iv) Chain Rule (v) Higher Order Derivatives	10
5	<u>Integration</u> (i) Antiderivatives. (ii) Fundamental Theorems of Calculus.	4
6	<u>Others</u> Preprimaries, Quizzes, Activities ...	6
Total		40

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	Recognize the characteristics of a function expressed in symbolic or graphic form.	Lecture and Tutorials	Exams, quizzes
1.2	Outline the definitions of limits and continuity a single-variable function and related theorems.	Lecture and Tutorials	Exams, quizzes
1.3	List the different rules, formulas and theorems for computing derivatives of functions.	Lecture and Tutorials	Exams, quizzes
1.4	Define the basic concepts and techniques of integration of polynomial, rational, and trigonometric functions.	Lecture and Tutorials	Exams, quizzes
2.0	Skills		
2.1	Analyze functions represented in a variety of ways: graphical, numerical or analytical.	Lecture/ ^(SEP) Individual or group work	Exams, quizzes
2.2	Determine the limits of functions and their continuity at points or on intervals.	Lecture/ ^(SEP) Individual or group work	Exams, quizzes
2.3	Calculate the derivative of various type of functions using the rules and techniques of differentiation.	Lecture/ ^(SEP) Individual or group work	Exams, quizzes

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.4	Apply the concept of derivative to completely analyze graph of a function.	Lecture/ ^[L] Individual or group work	Exams, quizzes
2.5	Evaluate integrals of real functions using basic rules and techniques of integration.	Lecture/ ^[L] Individual or group work	Exams, quizzes
3.0	Values		
3.1	Apply the computational and conceptual principles of calculus to the solutions of various mathematical problems.	Lecture/ ^[L] Individual or group work	Exams, quizzes
3.2	Justify the choice of different steps in problem resolution procedure.	Lecture/ ^[L] Individual or group work	Exams, quizzes
3.3	Solve problems using a range of formats and approaches in basic science.	Lecture/ ^[L] Individual or group work	Exams, quizzes
3.4	Show the ability to work independently and within groups.	Lecture/ ^[L] Individual or group work	Exams, quizzes

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm exam	Sixth week	30%
2	Quizzes and homeworks	During semester	20%
3	Final exam	End of semester	50%

*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 :

All faculty members are required to be in their offices outside teaching hours. Each member allocates at least 4 hours per week to give academic advice to students and to better explain the concepts seen during the lectures.

Students are required to complete the homework problems. Students are welcome to work together on homework. However, each student must turn in his or her own assignments, and no copying from another student's work is permitted. Deadline extensions for homework will not be given. Students are encouraged to discuss with professor about homework problems.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ul style="list-style-type: none"> Calculus (9th Edition), Dale Varberg, Edwin Purcell and Steven Rigdon, Prentice Hall (2006).
Essential References Materials	<ul style="list-style-type: none"> Thomas' Calculus (14th Edition), George B. Thomas Precalculus: Mathematics for Calculus (6th Edition), James Stewart
Electronic Materials	None

Other Learning Materials	None
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2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms
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)	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Direct
Quality of learning resources	Students	Direct
Extent of achievement of course learning outcomes	Faculty Member	Direct

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	30 May 2022

Course Title:	Discrete Structures (1)
Course Code:	CS1101
Program:	Bachelor of Data Science
Department:	Computer Science
College:	College of Computer and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 4
2. Course type
a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 1 / 1st year
4. Pre-requisites for this course (if any): N/A
5. Co-requisites for this course (if any): N/A

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	40
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course provides an elementary introduction to discrete mathematics. This course covers elementary discrete mathematics for computer science and engineering. It emphasizes mathematical definitions and proofs as well as applicable methods. Topics include Logic, Sets, Functions, Methods of Proofs, Sequence and Sums and Induction.

2. Course Main Objective

The Main Objective of this course is to introduce students to the ideas and techniques from discrete mathematics that are widely used in computer science and engineering. This course teaches the students techniques in how to think logically and mathematically and apply these techniques in solving problems with an emphasis on applications in computer sciences.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Construct the theoretical mathematical framework underlying key concepts in computer science.	K1
1.2	Establish the nature of mathematical reasoning, deductive logic and proofs.	K1
2	Skills :	
2.1	Demonstrate the connection between mathematical theory and its applications to computer problems.	S1
3	Values:	
3.1	Provide better understanding for further study in computability courses.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Logic and logical arguments	8
2	Sets	6
3	Functions	6
4	Methods of Proof	8
5	Sequence and Summations	6
6	Induction and Recursion	6
Total		40

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	Construct the theoretical mathematical framework underlying key concepts in computer science.	Lectures, Group Discussion, Office Hours	Participations, quizzes, lab exercises, assignments, and exams
1.2	Establish the nature of mathematical reasoning, deductive logic and proofs.	Lectures, Group Discussion, Office Hours	Participations, quizzes, lab exercises, assignments, and exams
2.0	Skills		
2.1	Demonstrate the connection between mathematical theory and its applications to computer problems.	Lectures, Group Discussion, Office Hours	Participations, quizzes, lab exercises, assignments, and exams
3.0	Values		
3.1	Provide better understanding for further study in computability courses.	Lectures, Group Discussion, Office Hours	Participations, quizzes, lab exercises,

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
			assignments, and exams

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Participation	1-10	10%
2	Assignments and Quizzes	1-10	20%
3	Mid-term Exam	5-6	20%
4	Final Exam	11-12	50%

*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 :

Two office hours each week of the course are designated for individual student consultations and academic advice.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Discrete Mathematics and Its Applications 8th Edition by Kenneth Rosen - McGraw Hill; 8th edition 2018 - ISBN-13:978-1259676512.
Essential References Materials	
Electronic Materials	Lecture slides. Review questions for each chapter. videos
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Traditional Classroom
Technology Resources (AV, data show, Smart Board, software, etc.)	Projector, Internet connection
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Teaching and assessment	Students	Indirect: a student-feedback form is distributed at the end of the course.
Achievement of CLOs	Instructor and Quality Assurance committee	Direct: analyze the grades of students in each assessment method to find out which CLOs are below 60%.
Course material	Instructor and curriculum committee	Indirect: course materials are regularly reviewed in order to keep it updated.

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	30 May 2022

Year 1 – Level 2

Course Title:	English Language 2
Course Code:	ELCE1202
Program:	Bachelor in EMI Colleges (Medical Colleges/ College of Engineering/ College of Computer Sciences/ College of Business Administration/ Applied Sciences)
Department:	English Language Centre
College:	English Language Centre
Institution:	Umm Al Qura University

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A. Course Identification

1. Credit hours: 4 hours
2. Course type a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 1st Year
4. Pre-requisites for this course (if any): ELCE1202 EMI Colleges – English Language 1
5. Co-requisites for this course (if any): N/A

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	12 hours per week	75%
2	Blended	16 hours per week	100%
3	E-learning	4 hours per week	25%
4	Distance learning	0	0
5	Other	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	(16 hours) X (10 weeks)
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	160 hours

B. Course Objectives and Learning Outcomes

1. Course Description

English Language 2 is a single-level, English for General Purposes (EGP) course. All students who are admitted to Bachelor in the EMI Colleges (Medical Colleges/ College of Engineering/ College of Computer Sciences/ College of Business Administration/ Applied Sciences) are required to take this course in the second semester of the first year of their program. The course is offered in 10 weeks with a 16-hour-per week teaching plan covering the four language skills. It intends to develop students' knowledge and ability of English language in all major skills which include reading, writing, listening, and speaking, as well as in sub-skills including grammar, vocabulary, and pronunciation.

2. Course Main Objective

English Language 2 is one level taking students from (CEFR) A2 to B1.

3. Course Learning Outcomes

CLOs	
1.0	Knowledge
1.1	<p>By the end of the course, the students are expected to be able to:</p> <p>exhibit adequate comprehension of simple and complex spoken materials at the B1 level through recognizing key words, stress, intonation, pauses, and linkers in fast speech.</p> <ul style="list-style-type: none"> - understand the main ideas of conversations, presentations, radio programmes, news reports, podcasts, discussions and interviews - identify main ideas and supporting ideas - develop listening for detail, examples and reasons - listen for opinions, attitude, and identify fact from opinion - identify rhetorical questions in a presentation - recognize how discourse markers help identify main points, especially in academic discussions, presentations and lectures
1.2	<p>demonstrate an understanding of grammar at the B1 level, incorporating tenses, part of speech, modal auxiliaries, and sentence structure.</p> <ul style="list-style-type: none"> - use indirect questions “Can you tell me where ...? I’d like to know what...” - use discourse markers for contrasting ideas - expand knowledge of present perfect to include how long something has occurred, and whether something has been done or not - use modals for giving advice “I would.../ you should/ could...” - be aware of the difference in use of present continuous, going to and will for the future - use -ed and -ing adjectives correctly to describe feelings or opinions - use the past simple and past continuous correctly in narrative - use conditionals for present and future real conditions, and for unreal conditions to talk about imaginary situations or to express wishes - use present and past passive tenses when a product is more important than the producer - use used to for past habits - use modals for necessity, obligation, etc
1.3	<p>recognize and use lexical items such as words, collocations, and derivatives, both in general and academic contexts at the B1 level.</p> <ul style="list-style-type: none"> - develop vocabulary of the topics covered in order to be able to talk about them with others - develop a bank of vocabulary for functional use, such as for describing the condition of possessions, for making decisions and plans, losing and finding things, describing progress - use linking words for contrast, such as <i>although</i>, <i>but</i>, <i>however</i>, <i>on the other hand</i>. Be aware of their position in sentences and whether they are used in formal or informal texts - use a range of vocabulary for describing graphs - use <i>this</i> and <i>these</i> for referencing within a text - be aware of collocations, such as <i>significant advantage</i>, <i>key point</i>, and how they can help to follow and understand a talk - be aware of the different types of phrasal verb - provide definitions of difficult vocabulary in presentations, using expressions such as ‘<i>what I mean is...</i>’ ‘<i>that’s when...</i>’
2.0	Skills
2.1	<p>Cognitive Skills:</p> <p>demonstrate comprehension of simple and complex written texts at the B1 level through applying the skills of scanning, skimming, guessing from context and through recognizing linking words.</p> <ul style="list-style-type: none"> - use scanning (to find information quickly) and skimming skills (to predict the meaning of the text from visuals, titles or common words) - identify the author or speaker’s audience and purpose - read for opinions, attitude, and identify fact from opinion - understand meaning from context in both written and spoken texts
2.1.1	

2.1.2	<p>compose coherent/cohesive texts at the B1 level for various general and academic purposes through applying the skills of brainstorming ideas, composing an outline, and editing/revision.</p> <ul style="list-style-type: none"> - write short texts, such as a travel post, movie review, an ad to request something, etc - write an email, short story or anecdote of more than one paragraph - use an appropriate opening and closing for a formal email - write a description of a trend (describing statistics), using notes - write complex sentences - support opinions with facts in formal (academic) writing - use a variety of linking words - use parallelism for bullet points in presentations and resumés
2.1.3	<p>communicate effectively in spoken language at the B1 level in tasks such as oral presentations, group discussion, expressing opinions, and short talks.</p> <ul style="list-style-type: none"> - discuss familiar and unfamiliar topics - reach a common consensus, eg who should be class leader - give short presentations - rank items in order of importance - show interest using short questions - repeat to show comprehension
2.2	<p>Critical Thinking</p> <ul style="list-style-type: none"> - develop well-reasoned, persuasive arguments - analyze sources of information when conducting research - evaluate things from a different perspective, eg what makes other people happy - evaluate and rank items according to usefulness or importance - evaluate arguments (evidence of support or relevance) - analyze advantages and disadvantages - infer meaning from written or spoken text - identify a specific audience and consider their need - appraise a text according to criteria, and provide feedback - identify inconsistencies and errors - appraise arguments - evaluate the approach of others and reflect on personal assumptions, beliefs and values - understand the links between ideas - organize ideas in a logical, systematic way - evaluate problems and propose solutions - reflect on knowledge gained
2.3	<p>Communication, Information Technology, Numerical</p> <ul style="list-style-type: none"> - research, discuss and present information - describe and give personal opinions on a variety of topics - express general beliefs - paraphrase where needed - give recommendations - present persuasively
2.4	<p>Psychomotor</p> <ul style="list-style-type: none"> - give confident, persuasive presentations - take part in a role play - use intonation to show mood: express agreement, surprise, confidence, trepidation, etc. - use softening techniques when expressing opinions - be aware of 'chunking' in speech - use linking and weak forms in sentences
3.0	Values
3.1	develop life-long learning strategies so that students can take full responsibility of their English language skill development.
3.2	develop academic integrity.

3.3	<p>collaborate in knowledge building and co-operate with peers:</p> <ul style="list-style-type: none"> - hold short discussions with a partner to activate knowledge before listening tasks - hold short discussions with a partner to synthesize knowledge post-listening - work with others to brainstorm, create a convincing argument - give feedback to peers on writing, presentations, etc. - ask for opinions and check information
3.4	<p>take the responsibilities to meet the requirements of the jobs market:</p> <ul style="list-style-type: none"> - write a personal statement - write a resumé - be aware of the importance of good time management - be aware of the importance of turn-taking in debates or discussions - be aware of learning from failure

C. Course Content

No	List of Topics	Contact Hours
Evolve 3 Special Edition: Level 2 (B1)		
1	Unit 1: Who We Are Personality, getting to know someone, spending money, qualities of a leader Video: What's the right job for you?	
2	Unit 2: So Much Stuff Personal possessions, describing things, switching topics, collecting things, the story of a person or place, essential items to take Video: Collections, old and new	
3	Unit 3: Smart Moves Describing a city, getting around, asking for and giving directions, a written personal statement, describing changes and trends, a 'secret spot' Video: One day in...	
4	Unit 4: Think First Opinions and reactions (" <i>it's interesting</i> "/ " <i>I'm interested</i> "), planning a trip, reassurance, describing plans, travel posts, microadventure Video: Making plans	
5	Unit 5: And then ... Lost and found, needing and giving help, surprises, storytelling, selfies, 'Believe it or not' Video: Lost and found	
6	Unit 6: Impact Big-city problems, problems and solutions, concern and relief, a podcast point of view, Big-city life, 'green' city planning Video: Green in the city	
7	Unit 7: Entertain Us Reading, TV and movies, declining invites, a movie review, children and technology, changing tastes Video: The history of cinema	
8	Unit 8: Getting There Recent activity, describing progress, catching up, time management, hobbies, a better life Video: Serious hobbies	
9	Unit 9: Make It Work College subjects, studying or working from home (WFH), confidence – or lack of it, a resumé, bilingual education, a perfect job Video: The college life	

10	Unit 10: Why We Buy 'Green' clothing, product origins, a good choice? Product feedback, souvenirs, psychology of shopping Video: Tricks of the ad world	
11	Unit 11: Pushing Yourself Success, unreal situations, giving and responding to opinions, your comfort zone, the psychology of fear, success stories Video: Testing your physical limits	
12	Unit 12: Life's Little Lessons Accidents, extreme experiences, describing and asking about feelings, an anecdote, learning a skill Video: I learned my lesson!	
Total		

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	<p>By the end of the course, the students are expected to be able to:</p> <p>exhibit adequate comprehension of simple and complex spoken materials at the B1 level through recognizing key words, stress, intonation, pauses, and linkers in fast speech.</p> <ul style="list-style-type: none"> - understand the main ideas of conversations, presentations, radio programmes, news reports, podcasts, discussions and interviews - identify main ideas and supporting ideas - develop listening for detail, examples and reasons - listen for opinions, attitude, and identify fact from opinion - identify rhetorical questions in a presentation - recognize how discourse markers help identify main points, especially in academic discussions, presentations and lectures 	Listening exercises	<p>Listening mid-term exam</p> <p>Listening final exam</p>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	<p>demonstrate an understanding of grammar at the B1 level, incorporating tenses, part of speech, modal auxiliaries, and sentence structure.</p> <ul style="list-style-type: none"> - use indirect questions “Can you tell me where ...? I’d like to know what...” - use discourse markers for contrasting ideas - expand knowledge of present perfect to include how long something has occurred, and whether something has been done or not - use modals for giving advice “I would.../ you should/ could...” - be aware of the difference in use of present continuous, going to and will for the future - use -ed and -ing adjectives correctly to describe feelings or opinions - use the past simple and past continuous correctly in narrative - use conditionals for present and future real conditions, and for unreal conditions to talk about imaginary situations or to express wishes - use present and past passive tenses when a product is more important than the producer - use used to for past habits - use modals for necessity, obligation, etc. 	Grammar exercises	<p>Midterm Exam</p> <p>Continuous writing assessment</p> <p>Continuous speaking assessment</p> <p>Quizzes</p> <p>Writing Final Exam</p> <p>Final Exam</p>
1.3	<p>recognize and use lexical items such as words, collocations, and derivatives, both in general and academic contexts at the B1 level.</p> <ul style="list-style-type: none"> - develop vocabulary of the topics covered in order to be able to talk about them with others - develop a bank of vocabulary for functional use, such as for describing the condition of possessions, for making decisions and plans, losing and finding things, describing progress - use linking words for contrast, such as although, but, however, on the other hand. Be aware of their position in sentences and whether they are used in formal or informal texts - use a range of vocabulary for describing graphs - use this and these for referencing within a text - be aware of collocations, such as significant advantage, key point, and how they can help to follow and understand a talk - be aware of the different types of phrasal verb - provide definitions of difficult vocabulary in presentations, using expressions such as ‘what I mean is...’ ‘that’s when...’ 	Writing, reading, and vocabulary exercises	<p>Midterm Exam</p> <p>Continuous writing assessment</p> <p>Continuous speaking assessment</p> <p>Quizzes</p> <p>Writing Final Exam</p> <p>Final Exam</p>

2.0	Skills		
2.1 2.1.1	<p>Cognitive Skills: demonstrate comprehension of simple and complex written texts at the B1 level through applying the skills of scanning, skimming, guessing from context and through recognizing linking words.</p> <ul style="list-style-type: none"> - use scanning (to find information quickly) and skimming skills (to predict the meaning of the text from visuals, titles or common words) - identify the author or speaker's audience and purpose - read for opinions, attitude, and identify fact from opinion - understand meaning from context in both written and spoken texts 	Reading comprehension exercises	Classroom discussion Midterm exam Final exam
2.1.2	<p>compose coherent/cohesive texts at the B1 level for various general and academic purposes through applying the skills of brainstorming ideas, composing an outline, and editing/revision.</p> <ul style="list-style-type: none"> - write short texts, such as a travel post, movie review, an ad to request something, etc - write an email, short story or anecdote of more than one paragraph - use an appropriate opening and closing for a formal email - write a description of a trend (describing statistics), using notes - write complex sentences - support opinions with facts in formal (academic) writing - use a variety of linking words - use parallelism for bullet points in presentations and resumés 	Writing exercises	Continuous writing assessment Writing Final Exam
2.1.3	<p>communicate effectively in spoken language at the B1 level in tasks such as oral presentations, group discussion, expressing opinions, and short talks.</p> <ul style="list-style-type: none"> - discuss familiar and unfamiliar topics - reach a common consensus, eg who should be class leader - give short presentations - rank items in order of importance - show interest using short questions - repeat to show comprehension 	Speaking exercises Discussion Presentation, eg an advertisement, a tourist campaign, a YouTube video	Continuous speaking assessment

2.2	<p>Critical Thinking</p> <ul style="list-style-type: none"> - develop well-reasoned, persuasive arguments - analyze sources of information when conducting research - evaluate things from a different perspective, eg what makes other people happy - evaluate and rank items according to usefulness or importance - evaluate arguments (evidence of support or relevance) - analyze advantages and disadvantages - infer meaning from written or spoken text - identify a specific audience and consider their need - appraise a text according to criteria, and provide feedback - identify inconsistencies and errors - appraise arguments - evaluate the approach of others and reflect on personal assumptions, beliefs and values - understand the links between ideas - organize ideas in a logical, systematic way - evaluate problems and propose solutions - reflect on knowledge gained 		
2.3	<p>Communication, Information Technology, Numerical</p> <ul style="list-style-type: none"> - research, discuss and present information - describe and give personal opinions on a variety of topics - express general beliefs - paraphrase where needed - give recommendations - present persuasively 	<p>Demonstrations Active self-learning Pair work Group work e-learning Online material (Encourage students to make their presentations to small groups in the class)</p>	<p>Monitoring students' progress</p> <p>Evaluating the individual contribution</p> <p>Evaluating the teamwork</p> <p>Evaluating the final product</p> <p>(Evaluation of presentations may be by peers)</p>
2.4	<p>Psychomotor</p> <ul style="list-style-type: none"> - give confident, persuasive presentations - take part in a role play - use intonation to show mood: express agreement, surprise, confidence, trepidation, etc - use softening techniques when expressing opinions - be aware of 'chunking' in speech - use linking and weak forms in sentences 	<p>Active self-learning Pair work Group work</p>	<p>Monitoring students' progress</p>

3.0	Values		
3.1	develop life-long learning strategies so that students can take full responsibility of their English language skill development.	Cambridge application Cambridge LMS	Built-in immediate feedback
3.2	develop academic integrity.	Writing exercises	Continuous writing assessment Continuous speaking assessment Writing Final Exam
3.3	collaborate in knowledge building and co-operate with peers: - hold short discussions with a partner to activate knowledge before listening tasks - hold short discussions with a partner to synthesize knowledge post-listening - work with others to brainstorm, create a convincing argument - give feedback to peers on writing, presentations, etc - ask for opinions and check information	Peer work Group work	Evaluating the individual contribution Evaluating the teamwork Evaluating the final product
3.4	take the responsibilities to meet the requirements of the jobs market: - write a personal statement - write a resumé - be aware of the importance of good time management - be aware of the importance of turn-taking in debates or discussions - be aware of learning from failure	Individual, peer and group work inside classrooms. Extramural language work to master the competencies at this language level.	Monitoring students' progress

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Exam	The 5 th	30
2	Listening Mid-term Exam	The 6 th	5
3	Continuous writing assessment	from the 1 st to the 10 th	5
4	Continuous speaking assessment	from the 1 st to the 10 th	5
5	3 Quizzes (average)	3 rd / 6 th / 9 th	5
6	Online Practice	from the 1 st to the 10 th	5
6	Listening Final Exam	The 10 th	5
7	Writing Final Exam	The 11 th	5
8	Final Exam	The 11 th	35
	Total		100

*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:

Course instructors are ready to answer all students' queries during their lectures or during office hours and they can be reached by personal meeting, e-mails, WhatsApp or telegram.

All students have the e-mail and office hours of the course instructor through student handouts distributed to the student at the beginning of each semester.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Hendra, L., Ibbotson, M., O'Dell, K., Tilbury, A. (2019). Evolve 3 Special Edition: Student's Book with Practice Extra. Cambridge University Press. UK: Cambridge University Press.
Essential References Materials	Multimedia
Electronic Materials	Cambridge LMS
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	data show, Smart Board, and Cambridge application
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Blackboard

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources.	Faculty members	Direct: Course reports
Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources.	University students	Direct: Evaluation surveys

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 Committee
Reference No.	
Date	May 30.2022

Course Title:	Computer Programming (1)
Course Code:	CS1211
Program:	Bachelor of Data Science
Department:	Computer Science
College:	Computer and Information Systems
Institution:	Umm Al Qura University

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A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 2 / 1st year
4. Pre-requisites for this course (if any): SE1101 Computational Thinking & Problem Solving
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	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces the basic concepts of computer programming to students with some problem-solving skills to solve complex problems. Students will be using a high-level programming language, to learn the fundamentals of computer programming skills including how to write, compile, and run programs using relevant tools for program development. Topics include variables and data types, methods, console input/output, control structures, coding styles, and the mechanics of running, testing, and debugging.

In this course, students will carry out practical projects that involve subsets of coding tasks in the lab alongside traditional lectures. Students will work individually as well as in pairs or small groups for some of the tasks. The course is organized to utilize a combination of project-based learning strategies and in-class lectures.

2. Course Main Objective

To equip students with the fundamental knowledge required to develop a procedural program using a high-level programming language.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Recognize high-level programming language	K1
1.2	Recognize basic control and repetition structures	K1
2	Skills:	
2.1	Design basic objects	S2
2.2	Analyze programming problems and implement programs that realize the required logic.	S1
2.3	Use the command line and relevant IDEs for writing, formatting, compiling, running, and debugging code.	S2
3	Values:	
3.1	Work effectively in a group	V1

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to high-level programming languages (general background, programming errors, coding styles, and how to edit, compile, and run programs in relevant IDE)	4
2	Variables, data types, assignment statements, constants, data type conversions, arithmetic expressions, and the String type	8
3	input/output	4
4	Control statements and Boolean expressions	8
5	Loops and repetition structures	8
6	Methods and using parameters	8
Total		40

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	Recognize high-level programming language	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Participations, quizzes, lab exercises, assignments, and exams
1.2	Recognize basic control and repetition structures	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Participations, quizzes, lab exercises, assignments and exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	Skills		
2.1	Design basic objects	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Quizzes, lab exercises, and exams
2.2	Analyze programming problems and implement programs that realize the required logic.	Lab exercises	Quizzes, lab exercises, and exams
2.3	Use the command line and relevant IDEs for writing, formatting, compiling, running, and debugging code.	Lab exercises	Lab exercises and assignments
3.0	Values		
3.1	Work effectively in a group	Lab exercises	Lab exercises

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments and Quizzes	1-10	15%
2	Lab exercise and Projects	1-10	15%
3	Mid-term Exam	5-6	20%
4	Theoretical and Practical Final Exam	11-12	50%

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:

Two office hours for each week of the course are designated for individual student consultations and academic advice.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	W. Savitch, JAVA: an introduction to problem solving and programming, global edition. Philadelphia, PA: Pearson Education, 2018.
Essential References Materials	Book and Slides

Electronic Materials	Slides and related handouts
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom & Laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	Overhead projector and smart board. Integrated Development Environment (e.g., NetBeans, Eclipse, JBuilder). Java Development Kit (JDK)
Other Resources (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Teaching and assessment	Students	Indirect: a student-feedback form is distributed at the end of the course.
Achievement of CLOs	Instructor and Quality Assurance committee	Direct: analyze the grades of students in each assessment method to find out which CLOs are below 60%.
Course material	Instructor and curriculum committee	Indirect: course materials are regularly reviewed in order to keep it updated.

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	30 May 2022

Course Title:	General Physics 1
Course Code:	PHY1110
Program:	Bachelor of Data Science
Department:	Physics
College:	Applied Science
Institution:	Umm Al Qura University

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A. Course Identification

1. Credit hours: 4
2. Course type
a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: level 4/ 2nd year
4. Pre-requisites for this course (if any):
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	30	50%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other	lab)) 30	50%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description
The course will cover the principle of general physics, such as measurements, vectors, Motion in one dimensions, Newton's laws, work and energy.
2. Course Main Objective
The course is design to provide students with some basic and essential concepts in general physics. The main subjects that this course covers are listed below. In addition to these items, the students should gain practical skills through conducting experiments in the laboratory.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	Knowledge and Understanding	
1.1	Define the concepts of the measurements, length, time, and weight.	K1
1.2	Differentiate between the vectors and the scalars	K1

CLOs		Aligned PLOs
2	Skills :	
2.1	Apply Newton's laws of motion to calculate the position, velocity and acceleration.	
2.2	Explain the motion in one and two dimensions.	
2.3	Relate force to potential and kinetic energies	
3	Values:	
3.1	Work effectively responsibly in teamwork	V1

C. Course Content

No	List of Topics	Contact Hours
1	Measurement Measuring Things The International System of Units Changing Units Time Mass	3
2	Motion Along a Straight Line Motion Position and Displacement Average Velocity and Average Speed Instantaneous Velocity and Speed Acceleration Constant Acceleration Free-Fall Acceleration	4
3	Vectors Vectors and Scalars Adding Vectors Geometrically Components of Vectors Unit Vectors Adding Vectors by Components Multiplying Vectors	4
4	Motion in Two and Three Dimensions Position and Displacement Average Velocity and Instantaneous Velocity Average Acceleration and Instantaneous Acceleration Projectile Motion Uniform Circular Motion	5
5	Force and Motion Newton's First Law Force Mass Newton's Second Law Newton's Third Law Applying Newton's Laws Friction (static and dynamic coefficients)	6
6	Kinetic Energy and Work Kinetic Energy Work Work and Kinetic Energy	4

	Power	
7	Potential Energy and Conservation of Energy Potential Energy Determining Potential Energy Values Conservation of Mechanical Energy Work Done on a System by an External Force Conservation of Energy	4
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 and understanding		
1.1	Define the concepts of the measurements, length, time, and weight.	1. Demonstrating the basic principles through lectures. 2. Discussing phenomena with illustrating pictures and diagrams. 3. Lecturing method: <ul style="list-style-type: none"> ● Board, Power point. ● Discussions ● Start each chapter by general idea and the benefit of it. 4. Perform some experiments in the Laboratory	1. Solve some examples during the lecture. 2. Discussions during the lectures 3. Exams: <ol style="list-style-type: none"> a) Quizzes. b) Midterm exams. c) Final exam. d) Practical exams.
1.2	Differentiate between the vectors and the scalars		
2.0	Skills		
2.1	Apply Newton's laws of motion to calculate the position, velocity and acceleration.	1. Solve some problems in class. 2. Explain some proofs during lectures. 3. Encourage students to participate in solving problems.	1. Solve some examples during the lecture. 2. Discussions during the lectures 3. Exams: <ol style="list-style-type: none"> a) Quizzes. b) Midterm exams. c) Final exam. d) Practical exams.
2.2	Explain the motion in one and two dimensions.		
2.3	Relate force to potential and kinetic energies		
3.0	Values		
3.1	Work effectively responsibly in teamwork	<ul style="list-style-type: none"> ● Organize the students as a small group in the lab to conduct experiments and prepare reports. 	<ul style="list-style-type: none"> ● Evaluate the scientific reports. ● Discussing the reports with each teamwork. ● Evaluate the reports of each student.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm exam	10 th	20 %
2	Homework & quizzes	All weeks	10 %

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Lab reports and final exam	End of the semester	20 %
4	Final written exam	End of the semester	50%

*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:

Each student has the chance to meet and discuss with his instructor in class and during office hours. Additionally, students can contact the coordinator of the course should they have any other issue in the course.)

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Halliday & Resnick, Jearl Walker, “Fundamentals of Physics” 10th Edition (2018)
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> ● Classroom ● Laboratory ● Library
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> ● Data show ● Black Bord
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching Strategies	Students	Questionnaire
Effectiveness of student assessment	Instructors of the course	Peer review of exam marking

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Extent of achievement of course learning outcomes	Instructor	Course report
Quality of learning resources	Instructor	Course report

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	30 May 2022

Course Title:	General Physics 1
Course Code:	PHY1110
Program:	Bachelor of Data Science
Department:	Physics
College:	Applied Science
Institution:	Umm Al Qura University

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A. Course Identification

1. Credit hours: 4
2. Course type
a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: level 4/ 2nd year
4. Pre-requisites for this course (if any):
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	30	50%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other	lab)) 30	50%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description
The course will cover the principle of general physics, such as measurements, vectors, Motion in one dimensions, Newton's laws, work and energy.
2. Course Main Objective
The course is design to provide students with some basic and essential concepts in general physics. The main subjects that this course covers are listed below. In addition to these items, the students should gain practical skills through conducting experiments in the laboratory.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	Knowledge and Understanding	
1.1	Define the concepts of the measurements, length, time, and weight.	K1
1.2	Differentiate between the vectors and the scalars	K1

CLOs		Aligned PLOs
2	Skills :	
2.1	Apply Newton's laws of motion to calculate the position, velocity and acceleration.	
2.2	Explain the motion in one and two dimensions.	
2.3	Relate force to potential and kinetic energies	
3	Values:	
3.1	Work effectively responsibly in teamwork	V1

C. Course Content

No	List of Topics	Contact Hours
1	Measurement Measuring Things The International System of Units Changing Units Time Mass	3
2	Motion Along a Straight Line Motion Position and Displacement Average Velocity and Average Speed Instantaneous Velocity and Speed Acceleration Constant Acceleration Free-Fall Acceleration	4
3	Vectors Vectors and Scalars Adding Vectors Geometrically Components of Vectors Unit Vectors Adding Vectors by Components Multiplying Vectors	4
4	Motion in Two and Three Dimensions Position and Displacement Average Velocity and Instantaneous Velocity Average Acceleration and Instantaneous Acceleration Projectile Motion Uniform Circular Motion	5
5	Force and Motion Newton's First Law Force Mass Newton's Second Law Newton's Third Law Applying Newton's Laws Friction (static and dynamic coefficients)	6
6	Kinetic Energy and Work Kinetic Energy Work Work and Kinetic Energy	4

	Power	
7	Potential Energy and Conservation of Energy Potential Energy Determining Potential Energy Values Conservation of Mechanical Energy Work Done on a System by an External Force Conservation of Energy	4
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 and understanding		
1.1	Define the concepts of the measurements, length, time, and weight.	1. Demonstrating the basic principles through lectures. 2. Discussing phenomena with illustrating pictures and diagrams. 3. Lecturing method: <ul style="list-style-type: none"> ● Board, Power point. ● Discussions ● Start each chapter by general idea and the benefit of it. 4. Perform some experiments in the Laboratory	1. Solve some examples during the lecture. 2. Discussions during the lectures 3. Exams: <ol style="list-style-type: none"> a) Quizzes. b) Midterm exams. c) Final exam. d) Practical exams.
1.2	Differentiate between the vectors and the scalars		
2.0	Skills		
2.1	Apply Newton's laws of motion to calculate the position, velocity and acceleration.	1. Solve some problems in class. 2. Explain some proofs during lectures. 3. Encourage students to participate in solving problems.	1. Solve some examples during the lecture. 2. Discussions during the lectures 3. Exams: <ol style="list-style-type: none"> a) Quizzes. b) Midterm exams. c) Final exam. d) Practical exams.
2.2	Explain the motion in one and two dimensions.		
2.3	Relate force to potential and kinetic energies		
3.0	Values		
3.1	Work effectively responsibly in teamwork	<ul style="list-style-type: none"> ● Organize the students as a small group in the lab to conduct experiments and prepare reports. 	<ul style="list-style-type: none"> ● Evaluate the scientific reports. ● Discussing the reports with each teamwork. ● Evaluate the reports of each student.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm exam	10 th	20 %
2	Homework & quizzes	All weeks	10 %

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Lab reports and final exam	End of the semester	20 %
4	Final written exam	End of the semester	50%

*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:

Each student has the chance to meet and discuss with his instructor in class and during office hours. Additionally, students can contact the coordinator of the course should they have any other issue in the course.)

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Halliday & Resnick, Jearl Walker, "Fundamentals of Physics" 10th Edition (2018)
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> ● Classroom ● Laboratory ● Library
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> ● Data show ● Black Bord
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching Strategies	Students	Questionnaire
Effectiveness of student assessment	Instructors of the course	Peer review of exam marking

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Extent of achievement of course learning outcomes	Instructor	Course report
Quality of learning resources	Instructor	Course report

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	30 May 2022

Year 1 – Level 3

Course Title:	English Language 3
Course Code:	ELCE1203
Program:	Bachelor in EMI Colleges (Medical Colleges/ College of Engineering/ College of Computer Sciences/ College of Business Administration/ Applied Sciences)
Department:	English Language Centre
College:	English Language Centre
Institution:	Umm Al Qura University

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A. Course Identification

1. Credit hours: 4 hours
2. Course type a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 1st Year
4. Pre-requisites for this course (if any): ELCE1202 EMI Colleges – English Language 1 & EMI Colleges – English Language 2
5. Co-requisites for this course (if any): N/A

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	12 hours per week	75%
2	Blended	16 hours per week	100%
3	E-learning	4 hours per week	25%
4	Distance learning	0	0
5	Other	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	(16 hours) X (10 weeks)
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	160 hours

B. Course Objectives and Learning Outcomes

1. Course Description

English Language 3 is a single-level, English for General Purposes (EGP) course. All students who are admitted to Bachelor in the EMI Colleges (Medical Colleges/ College of Engineering/ College of Computer Sciences/ College of Business Administration/ Applied Sciences) are required to take this course in the third semester of the first year of their program. The course is offered in 10 weeks with a 16-hour-per week teaching plan covering the four language skills. It intends to develop students' knowledge and ability of English language in all major skills which include reading, writing, listening, and speaking, as well as in sub-skills including grammar, vocabulary, and pronunciation.

2. Course Main Objective

English Language 3 is one level taking students from (CEFR) B1 to B1+.

3. Course Learning Outcomes

CLOs	
1.0	Knowledge
1.1	<p>By the end of the course, the students are expected to be able to:</p> <p>exhibit adequate comprehension of simple and complex spoken materials at the B1+ level through recognizing key words, stress, intonation, pauses, and linkers in fast speech.</p> <ul style="list-style-type: none"> - understand the main ideas of conversations, presentations, radio programmes, news reports, podcasts, discussions and interviews - identify main ideas and supporting ideas - develop listening for detail, examples and reasons - listen for transition words in spoken contexts to help follow the speech or conversation - recognize how stress can emphasize a new point is being made - listen to the tone to distinguish attitude
1.2	<p>demonstrate an understanding of grammar at the B1+ level, incorporating tenses, part of speech, modal auxiliaries, and sentence structure.</p> <ul style="list-style-type: none"> - be aware of the difference between stative and dynamic verbs, and how rules may change in informal speech, eg <i>"I'm loving it"</i> - modify comparisons, <i>"by far the best"</i>, <i>"a little busier"</i> - use modals for speculation, <i>"it may be..."</i> <i>"it could be"</i> - use subject and object relative clauses correctly - use the present unreal conditional to discuss hypothetical situations, e.g. <i>"if I were prime minister, I would..."</i> - use modals to discuss past probability - understand the difference between the use of gerunds and infinitives after <i>forget, remember, stop</i>
1.3	<p>recognize and use lexical items such as words, collocations, and derivatives, both in general and academic contexts at the B1+ level.</p> <ul style="list-style-type: none"> - develop vocabulary of the topics covered in order to be able to talk about them with others - be aware of, and build word families - be aware of the meaning of ALL CAPS in text messages - use reporting words to convey meaning, e.g. <i>explained, persuaded</i> - use various expressions (<i>not supposed to, allowed to</i>) to express prohibition, permission or obligation - understand the use of the causative verbs, <i>help, let, make</i> - recognize substitution and referencing in texts - be aware of importance of linking words in academic texts, and develop the range and use - reference another argument in your writing
2.0	Skills
2.1	<p>Cognitive Skills:</p> <p>demonstrate comprehension of simple and complex written texts at the B1+ level through applying the skills of scanning, skimming, guessing from context and through recognizing linking words.</p> <ul style="list-style-type: none"> - infer attitude and meaning - identify arguments and support - identify main points of paragraphs, and make notes on the details to facilitate summarizing or paraphrasing later - note the use of adjectives and adverbs to discern attitude in text - recall key information - develop different note-taking skills, such as the use of timelines for chronologically ordered texts
2.1.2	<p>compose coherent/cohesive texts at the B1+ level for various general and academic purposes through applying the skills of brainstorming ideas, composing an outline, and editing/revision.</p> <ul style="list-style-type: none"> - write a variety of texts of several paragraphs - write a letter of apology - write formal and informal emails - produce and conduct a survey, and write a description of the data results - write complex sentences, using <i>after, while, until</i> - reread and proofread to improve a finished text

CLOs	
2.1.3	<p>communicate effectively in spoken language at the B1+ level in tasks such as oral presentations, group discussion, expressing opinions, and short talks.</p> <ul style="list-style-type: none"> - discuss familiar and unfamiliar topics - take part in an interview, role plays, debates and discussions - give short presentations - use signals to get back on track, eg <i>anyway, where was I?</i> - discuss hypothetical situations, eg life without a phone - talk about wishes and hopes
2.2	<p>Critical Thinking</p> <ul style="list-style-type: none"> - develop well-reasoned, persuasive arguments - analyze sources of information when conducting research - analyze and interpret the results of a survey - evaluate things from a different perspective - reflect on own assumptions, beliefs and values - evaluate and rank items according to usefulness or importance - evaluate arguments (evidence of support or relevance) - infer meaning from written or spoken text - appraise a text according to criteria, and provide feedback - appraise arguments, identify inconsistencies and errors - understand the links between ideas - organize ideas in a logical, systematic way - evaluate problems and propose solutions - reflect on knowledge gained
2.3	<p>Communication, Information Technology, Numerical</p> <ul style="list-style-type: none"> - research, discuss and present information - describe and give personal opinions on a variety of topics - express general beliefs - reach a compromise to solve a problem
2.4	<p>Psychomotor</p> <ul style="list-style-type: none"> - give confident, persuasive presentations - take part in an interview, role plays, debates and discussions - place stress correctly in long words
3.0	Values
3.1	develop life-long learning strategies so that students can take full responsibility of their English language skill development.
3.2	develop academic integrity.
3.3	<p>collaborate in knowledge building and co-operate with peers:</p> <ul style="list-style-type: none"> - hold short discussions with a partner to activate knowledge before listening tasks - hold short discussions with a partner to synthesize knowledge post-listening - work with others to brainstorm, create a convincing argument - work with others to rank items in order of importance - give feedback to peers on writing, presentations, etc - ask for opinions and check information
3.4	<p>take the responsibilities to meet the requirements of the jobs market:</p> <ul style="list-style-type: none"> - recognize good employee qualities - take part in a job interview role play - appraise the interview performance of others, and provide written feedback - be able to justify your decisions - be aware of how to manage stress in the workplace - develop note-taking skills - maintain a calm rather formal tone when something goes wrong in business - repair a customer relationship - write a public apology - use key formal phrases in business correspondence, such as “I look forward to hearing from you”

C. Course Content

No	List of Topics	Contact Hours
Evolve 4 Special Edition: Level 3 (B1+)		
1	Unit 1: And We're Off Personal achievements, right qualities for the job, introductions, responding to an article on job interviews, sport science: presentation examples, a job interview Video: Fit for the job	
2	Unit 2: The Future of Food Trends, food preparation, offers: making, accepting and declining, a food survey, traditional dishes, restaurant rescue Video: Green cities	
3	Unit 3: What's It Worth? Time and money, value for money, apologizing, product reviews, work-life balance, responding to negative reviews Video: Save now, pay later	
4	Unit 4: Going Local Merchandising, viral stories, discussing opinions, brands, product and business reviews, design an ad Video: Saving the world, one hour at a time	
5	Unit 5: True Stories Stories, changing plans, reacting to bad news, a written apology, language learning, a chance meeting Video: Walking and talking	
6	Unit 6: Community Action Charities and volunteers, acts of kindness, help: offering, accepting and refusing, a community project, responding to offers and requests, an urban art project Video: Can do!	
7	Unit 7: Can We Talk? Text messaging apps, written vs spoken language, retelling a story, formal vs informal communication, critical literacy, an online survey Video: Mobile communication in Africa	
8	Unit 8: Lifestyles Work lifestyles, wishes and regrets, considering options, comment on a podcast, post practical advice, digital detox Video: Start-up life	
9	Unit 9: Yes, you can Rules and regulations, discussing rules, tipping, a letter of complaint, a case study: urban regeneration, making improvements Video: Opening doors for everyone	
10	Unit 10: What if? Accidental discoveries, alternatives and possibilities, engaging the listener, good and bad inventions, turning points, the greatest invention? Video: Game of bones	
11	Unit 11: Contrasts College life, scientific facts, discussing alternatives, commenting on new technology, a healthy diet, mediation Video: The future of driving	

12	Unit 12: Looking Back The story behind a photo, childhood memories, sharing past experiences, zoos: the pros and cons, national traditions, a 'national moment' Video: the good old days?	
Total		

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	<p>By the end of the course, the students are expected to be able to:</p> <p>exhibit adequate comprehension of simple and complex spoken materials at the B1+ level through recognizing key words, stress, intonation, pauses, and linkers in fast speech.</p> <ul style="list-style-type: none"> - understand the main ideas of conversations, presentations, radio programmes, news reports, podcasts, discussions and interviews - identify main ideas and supporting ideas - develop listening for detail, examples and reasons - listen for transition words in spoken contexts to help follow the speech or conversation - recognize how stress can emphasize a new point is being made - listen to the tone to distinguish attitude 	Listening exercises	<p>Listening mid-term exam</p> <p>Listening final exam</p>
1.2	<p>demonstrate an understanding of grammar at the B1+ level, incorporating tenses, part of speech, modal auxiliaries, and sentence structure.</p> <ul style="list-style-type: none"> - be aware of the difference between stative and dynamic verbs, and how rules may change in informal speech, eg "<i>I'm loving it</i>" - modify comparisons, "<i>by far the best</i>", "<i>a little busier</i>" - use modals for speculation, "<i>it may be...</i>" "<i>it could be</i>" - use subject and object relative clauses correctly - use the present unreal conditional to discuss hypothetical situations, e.g. "<i>if I were prime minister, I would...</i>" - use modals to discuss past probability - understand the difference between the use of gerunds and infinitives after <i>forget</i>, <i>remember</i>, <i>stop</i> 	Grammar exercises	<p>Midterm Exam</p> <p>Continuous writing assessment</p> <p>Continuous speaking assessment</p> <p>Quizzes</p> <p>Writing Final Exam</p> <p>Final Exam</p>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	<ul style="list-style-type: none"> - recognize and use lexical items such as words, collocations, and derivatives, both in general and academic contexts at the B1+ level. - develop vocabulary of the topics covered in order to be able to talk about them with others - be aware of, and build word families - be aware of the meaning of ALL CAPS in text messages - use reporting words to convey meaning, e.g. <i>explained, persuaded</i> - use various expressions (<i>not supposed to, allowed to</i>) to express prohibition, permission or obligation - understand the use of the causative verbs, <i>help, let, make</i> - recognize substitution and referencing in texts - be aware of importance of linking words in academic texts, and develop the range and use - reference another argument in your writing 	Writing, reading, and vocabulary exercises	Midterm Exam Continuous writing assessment Continuous speaking assessment Quizzes Writing Final Exam Final Exam
2.0	Skills		
2.1	Cognitive Skills: demonstrate comprehension of simple and complex written texts at the B1+ level through applying the skills of scanning, skimming, guessing from context and through recognizing linking words.	Reading comprehension exercises	Classroom discussion Midterm exam Final exam
2.1.1	<ul style="list-style-type: none"> - infer attitude and meaning - identify arguments and support - identify main points of paragraphs, and make notes on the details to facilitate summarizing or paraphrasing later - note the use of adjectives and adverbs to discern attitude in text - recall key information - develop different note-taking skills, such as the use of timelines for chronologically ordered texts 		
2.1.2	compose coherent/cohesive texts at the B1+ level for various general and academic purposes through applying the skills of brainstorming ideas, composing an outline, and editing/revision.	Writing exercises	Continuous writing assessment Writing Final Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1.3	<p>communicate effectively in spoken language at the B1+ level in tasks such as oral presentations, group discussion, expressing opinions, and short talks.</p> <ul style="list-style-type: none"> - discuss familiar and unfamiliar topics - take part in an interview, role plays, debates and discussions - give short presentations - use signals to get back on track, eg <i>anyway, where was I?</i> - discuss hypothetical situations, eg life without a phone - talk about wishes and hopes 	<p>Speaking exercises Discussion Presentation, eg an advertisement, a tourist campaign, a YouTube video</p>	<p>Continuous speaking assessment</p>
2.2	<p>Critical Thinking</p> <p>develop well-reasoned, persuasive arguments</p> <ul style="list-style-type: none"> - analyze sources of information when conducting research - analyze and interpret the results of a survey - evaluate things from a different perspective - reflect on own assumptions, beliefs and values - evaluate and rank items according to usefulness or importance - evaluate arguments (evidence of support or relevance) - infer meaning from written or spoken text - appraise a text according to criteria, and provide feedback - appraise arguments, identify inconsistencies and errors - understand the links between ideas - organize ideas in a logical, systematic way - evaluate problems and propose solutions - reflect on knowledge gained 		
2.3	<p>Communication, Information Technology, Numerical</p> <ul style="list-style-type: none"> - research, discuss and present information - describe and give personal opinions on a variety of topics - express general beliefs reach a compromise to solve a problem 	<p>Demonstrations Active self-learning Pair work Group work e-learning Online material (Encourage students to make their presentations to small groups in the class)</p>	<p>Monitoring students' progress</p> <p>Evaluating the individual contribution</p> <p>Evaluating the teamwork</p> <p>Evaluating the final product</p> <p>(Evaluation of presentations may be by peers)</p>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.4	Psychomotor - give confident, persuasive presentations - take part in an interview, role plays, debates and discussions - place stress correctly in long words	Active self-learning Pair work Group work	Monitoring students' progress
3.0	Values		
3.1	develop life-long learning strategies so that students can take full responsibility of their English language skill development.	Cambridge application Cambridge LMS	Built-in immediate feedback
3.2	develop academic integrity.	Writing exercises	Continuous writing assessment Continuous speaking assessment Writing Final Exam
3.3	collaborate in knowledge building and co-operate with peers: - hold short discussions with a partner to activate knowledge before listening tasks - hold short discussions with a partner to synthesize knowledge post-listening - work with others to brainstorm, create a convincing argument - give feedback to peers on writing, presentations, etc - ask for opinions and check information	Peer work Group work	Evaluating the individual contribution Evaluating the teamwork Evaluating the final product
3.4	take the responsibilities to meet the requirements of the jobs market: - write a personal statement - write a resumé - be aware of the importance of good time management - be aware of the importance of turn-taking in debates or discussions - be aware of learning from failure	Individual, peer and group work inside classrooms. Extramural language work to master the competencies at this language level.	Monitoring students' progress

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Exam	The 5 th	30
2	Listening Mid-term Exam	The 6 th	5
3	Continuous writing assessment	from the 1 st to the 10 th	5
4	Continuous speaking assessment	from the 1 st to the 10 th	5
5	3 Quizzes (average)	3 rd / 6 th / 9 th	5
6	Online Practice	from the 1 st to the 10 th	5
6	Listening Final Exam	The 10 th	5
7	Writing Final Exam	The 11 th	5
8	Final Exam	The 11 th	35
	Total		100

*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:

Course instructors are ready to answer all students' queries during their lectures or during office hours and they can be reached by personal meeting, e-mails, WhatsApp or telegram.

All students have the e-mail and office hours of the course instructor through student handouts distributed to the student at the beginning of each semester.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Goldstein, B., Jones, C., Hendra, L., Tilbury, A. (2019). Evolve 4 Special Edition: Student's Book with Practice Extra. Cambridge University Press. UK: Cambridge University Press.
Essential References Materials	Multimedia
Electronic Materials	Cambridge LMS
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	data show, Smart Board, and Cambridge application
Other Resources	Blackboard

Item	Resources
(Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources.	Faculty members	Direct: Course reports
Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources.	University students	Direct: Evaluation surveys

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 Committee
Reference No.	
Date	May 30.2022

اسم المقرر:	مهارات التأهيل المهني
رمز المقرر:	BA3902
البرنامج:	متطلب جامعي
القسم العلمي:	إدارة الأعمال
الكلية:	إدارة الأعمال
المؤسسة:	جامعة أم القرى

أ. التعريف بالمقرر الدراسي:	84
ب. هدف المقرر ومخرجاته التعليمية:	84
1. الوصف العام للمقرر:	84
2. الهدف الرئيس للمقرر	84
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أ. التعريف بالمقرر الدراسي:

1. الساعات المعتمدة:	
2. نوع المقرر	
أ. <input type="checkbox"/> متطلبات جامعة <input checked="" type="checkbox"/>	<input type="checkbox"/> متطلبات كلية <input type="checkbox"/>
ب. <input type="checkbox"/> إجباري <input checked="" type="checkbox"/>	<input type="checkbox"/> اختياري <input checked="" type="checkbox"/>
3. السنة / المستوى الذي يقدم فيه المقرر	
4. المتطلبات السابقة لهذا المقرر (إن وجدت)	
5. المتطلبات المتزامنة مع هذا المقرر (إن وجدت)	

6. نمط الدراسة (اختر كل ما ينطبق)

م	نمط الدراسة	عدد الساعات التدريسية	النسبة
1	المحاضرات التقليدية		
2	التعليم المدمج		
3	التعليم الإلكتروني		
4	التعليم عن بعد	2	100%
5	أخرى		

7. ساعات الاتصال (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم
1	محاضرات	20
2	معمل أو إستوديو	
3	دروس إضافية	
4	أخرى (تذكر)	
	الإجمالي	20

ب- هدف المقرر ومخرجاته التعليمية:

<p>1. الوصف العام للمقرر: المقرر يساهم في تمكين الطالب من الإلمام بالمهارات الضرورية التي تؤهله للحصول على وظيفة، وأبعد من هذا تعزيز قدراته ومهاراته لتحقيق النجاح الوظيفي في مساره المهني مستقبلاً.</p>
<p>2. الهدف الرئيس للمقرر المقرر يهدف أساساً لمساعدة الطالب في بناء تصور عن شخصيته وميوله المهني، وتزويده بالمهارات والمعارف اللازمة للحصول على وظيفة أثناء الدراسة الجامعية أو بعد التخرج، وعلى كيفية الاستعداد الجيد لسوق العمل. بالإضافة إلى ذلك؛ يركز المقرر على طيف واسع من أساسيات النجاح الوظيفي في المسار المهني للطالب في وظيفته المستقبلية، وتدريبه على بناء خطة تطبيقية للتطوير المهني المستمر يستفيد منها طوال حياته المهنية، بالإضافة إلى تعريفه بأساليب تصميم الوظيفة وتعزيز الارتباط الوظيفي مع مهارات التوازن بين العمل والحياة. يهدف المقرر كذلك لتدريب الطالب على مهارات الاتصال في بيئة العمل وتزويد الطالب بمعرفة عميقة عن حقوقه وواجباته الوظيفية وأخلاقيات السلوك المهني الرشيد، بالإضافة إلى مهارات عديدة كالعمل مع فرق العمل ومهارات الإلقاء والتقديم والتعامل مع العملاء والمستفيدين.</p>
<p>3. مخرجات التعلم للمقرر:</p>

رمز مخرج التعلم المرتبط للبرنامج	مخرجات التعلم للمقرر
	1 المعرفة والفهم

رمز مخرج التعلم المرتبط للبرنامج	مخرجات التعلم للمقرر
	1.1 أن يصف/يحدد الطالب شخصيته واهتماماته ومهاراته ونقاط قوته
	1.2 أن يميز أساسيات السلوك الإنساني في بيئة العمل
	1.3 أن يذكر الطالب حقوقه وواجباته الوظيفية
	1.4
	1.5
	2 المهارات
	2.1 أن يستعرض الطالب مهاراته في البحث عن وظيفة
	2.2 أن يصمم الطالب سيرة ذاتية ملائمة لاحتياجات سوق العمل
	2.3 أن يصمم الطالب خطة شخصية للتطوير المهني المستمر
	3 القيم
	3.1 أن يبدي الطالب اهتماماً نحو السلوك الأخلاقي في العمل
	3.2 أن يحترم الطالب الواجبات الوظيفية الملقة على عاتقه
	3.3 أن ينمو شعور الطالب نحو أهمية العلامة الشخصية وهويته الرقمية
	3...

ج. موضوعات المقرر

م	قائمة الموضوعات	ساعات الاتصال
1	الاستعداد الوظيفي: التقييم الذاتي وتحديد الشخصية والاهتمامات والمهارات ونقاط القوة	2
2	الاستعداد الوظيفي: أنواع الوظائف ومهارات البحث عن عمل ودور التلمذة المهنية والتطوع	2
3	الاستعداد الوظيفي: تصميم السيرة الذاتية واجتياز المقابلات	2
4	السلوك الإنساني في بيئة العمل: الحقوق والواجبات الوظيفية والسلوك الأخلاقي في العمل	2
5	السلوك الإنساني في بيئة العمل: القدرات، التعلم، الاتجاهات، الرضا الوظيفي	2
6	السلوك الإنساني في بيئة العمل: أساسيات العمل مع فرق العمل	2
7	السلوك الإنساني في بيئة العمل: مهارات الاتصال في بيئة العمل	2
8	السلوك الإنساني في بيئة العمل: القيادة ومهارات إتباع القادة	2
9	النمو المهني: أساسيات المالية الشخصية	2
10	النمو المهني: مهارات التطوير المهني المستمر	2
11	النمو المهني: الإيسام الشخصي والهوية الرقمية	2
	المجموع	

د. التدريس والتقييم:

1. ربط مخرجات التعلم للمقرر مع كل من استراتيجيات التدريس وطرق التقييم

الرمز	مخرجات التعلم	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم		
1.1	أن يصف/يحدد الطالب شخصيته واهتماماته ومهاراته ونقاط قوته	المحاضرات - المناقشات	اختبار تحديد الشخصية والميول المهني - المشاركة الفصلية
1.2	أن يميز أساسيات السلوك الإنساني في بيئة العمل	المحاضرات - المناقشات	التكليفات - الاختبارات - المشاركة الفصلية
1.3	أن يذكر الطالب حقوقه وواجباته الوظيفية	المحاضرات - المناقشات	التكليفات - الاختبارات - المشاركة الفصلية
2.0	المهارات		
2.1	أن يستعرض الطالب مهاراته في البحث عن وظيفة	المحاضرات - المناقشات	المشروع الجماعي - الاختبارات - المشاركة الفصلية

الرمز	مخرجات التعلم	استراتيجيات التدريس	طرق التقييم
2.2	أن يصمم الطالب سيرة ذاتية ملائمة لاحتياجات سوق العمل	المحاضرات - المناقشات	مشروع تصميم السيرة الذاتية - الاختبارات - المشاركة الفصلية
2.3	أن يصمم الطالب خطة شخصية للتطوير المهني المستمر	المحاضرات - المناقشات	مشروع خطة التطوير المهني المستمر - الاختبارات - المشاركة الفصلية
3.0	القيم		
3.1	أن يبدي الطالب اهتماماً نحو السلوك الأخلاقي في العمل	المحاضرات - القراءة الموجهة	دراسة حالات
3.2	أن يحترم الطالب الواجبات الوظيفية الملقاة على عاتقه	المحاضرات - القراءة الموجهة	دراسة حالات
3.3	أن ينمو شعور الطالب نحو أهمية العلامة الشخصية وهويته الرقمية	المحاضرات - القراءة الموجهة	تصميم صفحة لينكد-إن

2. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	خطة للتطوير المهني المستمر	11	10
2	تصميم السيرة الذاتية و صفحة لينكد-إن	8	15
3	اختبار نصفي	6	20
4	اختبار نهائي	12	40
5	عرض تقديمي جماعي	12	15
6			
7			
8			

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل الخ)

هـ - أنشطة الإرشاد الأكاديمي والدعم الطلابي:

- تحديد أوقات الساعات المكتبية وإحاطة الطلاب بها
- تزويد الطلاب بخطة المقرر وآلية التقييم من بداية الفصل الدراسي، ومراجعتها معهم دورياً
- تتبع حالات الطلاب منخفضي الأداء وتقديم الدعم اللازم لهم

و - مصادر التعلم والمرافق:

1. قائمة مصادر التعلم:

السلوك التنظيمي: سلوك الأفراد والجماعات في المنظمات - الأستاذ الدكتور/محمد زناتي	المرجع الرئيس للمقرر
<ul style="list-style-type: none"> • يُنظر في المراجع المساندة أيضاً • كتاب المسار: دليل التطوير المهني - الأستاذ مشاري الغامدي • كتاب فن البحث عن وظيفة - الأستاذ أحمد بادويلان • كتاب: ثاني لفة يمين - د. أمجد الجنباز • *Kaiden, S. ed., 2016. Find Your Fit: A Practical Guide to Landing a Job You'll Love. Association for Talent Development. : https://www.amazon.com/Find-Your-Fit-Practical-Landing-ebook/dp/B01LY7XO6K 	المراجع المساندة

<ul style="list-style-type: none"> • *Stella Cottrell (2021). Skills for Success: Personal Development and Employability: 4th ed (Macmillan Study Skills) • Ranjit Singh Malhi 2009. Make Yourself Employable: How Graduates Can Hit the Ground Running! – الكتاب مترجم في جرير: – https://www.jarir.com/jarir-publication-282205762.html جعل نفسك جديراً بالتوظيف • Roy Horn 2020. The Business Skills Handbook. https://www.koganpage.com/product/business-skills-handbook-9781843982180-cipd • Robbins and Judge (2022). Essentials of Organizational Behavior. 15th edition. 	
<ul style="list-style-type: none"> • مقياس الميول المهنية – مركز قياس: https://etec.gov.sa/ar/productsandservices/Qiyas/CommStandards/Pages/Professional.aspx • اللائحة التنفيذية للموارد البشرية في الخدمة المدنية - https://hrsd.gov.sa/ar • موقع البوابة الوطنية للعمل - طاقات: https://www.taqat.sa/web/guest • موقع العمل المرن: https://mrn.sa • موقع المنصة الوطنية للتدريب الإلكتروني - دروب: https://doroob.sa/ar • أكاديمية مسك - https://hub.misk.org.sa/?lang=ar • Myers-Briggs Type Indicator (MBTI): https://www.myersbriggs.org/my-mbti-personality-type/ • DISC: https://www.discprofile.com/ • The Big Five Personality Test: https://www.outofservice.com/bigfive/ 	المصادر الإلكترونية
المكتبة الرقمية السعودية	أخرى

2. المرافق والتجهيزات المطلوبة:

متطلبات المقرر	العناصر
قاعات دراسية تناسب عدد الطلاب	المرافق (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)
جهاز حاسوب مزود بالانترنت، سبورة ذكية	التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)
	تجهيزات أخرى (تبعاً لطبيعة التخصص)

ز. تقويم جودة المقرر:

طرق التقويم	المقيمون	مجالات التقويم
استطلاعات مباشرة، وملاحظة غير مباشرة	الطلاب – منسق المقرر – رئيس القسم – قيادات البرنامج	فاعلية التدريس
مباشرة: عينة عشوائية من نماذج تقييم الطلاب وأعمالهم	المراجع النظير - منسق المقرر – رئيس القسم – قيادات البرنامج	فاعلية طرق تقييم الطلاب
مباشرة: نتائج الطلاب في الاختبارات الدورية والنهائية	المراجع النظير - منسق المقرر – رئيس القسم – قيادات البرنامج	مدى تحصيل مخرجات التعلم للمقرر

مجالات التقويم	المقيمون	طرق التقييم

مجالات التقويم (مثل: فاعلية التدريس، فاعلة طرق تقييم الطلاب، مدى تحصيل مخرجات التعلم للمقرر، مصادر التعلم ... إلخ)
المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها)
طرق التقييم (مباشر وغير مباشر)

ح. اعتماد التوصيف

	جهة الاعتماد
	رقم الجلسة
	تاريخ الجلسة

Course Title:	Computer Programming (2)
Course Code:	CS1312
Program:	Bachelor of Data Science
Department:	Computer Science
College:	Computer and Information Systems
Institution:	Umm Al Qura University

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3. Level/year at which this course is offered:.....	91
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5. Co-requisites for this course (if any): None	91
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A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 3 / 1st year
4. Pre-requisites for this course (if any): CS1211 Computer Programming (1)
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	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course covers various core concepts of computer programming alongside an introduction to object-oriented with some problem-solving skills to solve moderately complex problems. Students will be using a high-level programming language, to learn arrays and the basics of object-oriented concepts skills including how to write, compile, and run programs using relevant tools for program development.

In this course, students will carry out practical projects that involve subsets of coding tasks in the lab alongside traditional lectures. Students will work individually as well as in pairs or small groups for some of the tasks. The course is organized to utilize a combination of project-based learning strategies and in-class lectures.

2. Course Main Objective

To equip students with the core knowledge required to develop a procedural program using a high-level programming language alongside the basic knowledge and understanding of structured programming paradigm.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Acquire the concepts of object-oriented Programming.	K1
2	Skills :	
2.1	Demonstrate basic knowledge and understanding of structured programming paradigm	S1
2.2	Use standard programming design and development principles on some moderately complex problems.	S2
3	Values:	
3.1	Work effectively in a group	V1

C. Course Content

No	List of Topics	Contact Hours
1	Arrays and Vectors	4
2	Recursion	4
3	Files processing	4
4	Introduction to object-oriented concept	4
5	Classes and objects: the building blocks	8
6	Encapsulation and data hiding	8
7	Inheritance and code reusability	8
Total		40

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	Recognize object-oriented concepts	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Participations, quizzes, lab exercises, assignments, and exams
2.0	Skills		
2.1	Demonstrate basic knowledge and understanding of structured programming paradigm	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Quizzes, lab exercises, and exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	Use standard programming design and development principles on some moderately complex problems.	Lab exercises	Lab exercises
3.0	Values		
3.1	Work effectively in a group	Lab exercises	Lab exercises

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments and Quizzes	1-10	15%
2	Lab exercise and Projects	1-10	15%
3	Mid-term Exam	5-6	20%
4	Theoretical and Practical Final Exam	11-12	50%

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 :

Two office hours for each week of the course are designated for individual student consultations and academic advice.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	W. Savitch, JAVA : an introduction to problem solving and programming, global edition. Philadelphia, PA: Pearson Education, 2018.
Essential References Materials	Book and Slides
Electronic Materials	Slides and related handouts
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom & Laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	Overhead projector and smart board. Integrated Development Environment (e.g., NetBeans, Eclipse, JBuilder). Java Development Kit (JDK)

Item	Resources
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Teaching and assessment	Students	Indirect: a student-feedback form is distributed at the end of the course.
Achievement of CLOs	Instructor and Quality Assurance committee	Direct: analyze the grades of students in each assessment method to find out which CLOs are below 60%.
Course material	Instructor and curriculum committee	Indirect: course materials are regularly reviewed in order to keep it updated.

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	30 May 2022

Course Title:	Topics in Computing
Course Code:	DS1302
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer Science and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours:
2. Course type
a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Year 1
4. Pre-requisites for this course (if any):
5. Co-requisites for this course (if any): N/Y

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3	100%
2	Blended	0	0
3	E-learning	0	0
4	Distance learning	0	0
5	Other	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	3
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces students to basic computer concepts in hardware, software, networking, computer security, programming, database, decision support systems, and other emerging technologies such as blogs, software, and applications. Additional, lectures examine social, legal, ethical issues including privacy, intellectual property, green computing, and accessibility. Students will be able to learn about techniques of using new technology. Widely used applications including databases, IOT, and web development software are studied. Finally, students will have some knowledge about the future of technology, such as Artificial Intelligence (AI).

2. Course Main Objective

The main objective of this course is to understand basic functions of computer hardware and software components including operating system functions. This course makes students able to use different application and database management systems, as well as, understand the fundamentals of system analysis, life cycle of a program development and programming languages, AI.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Understand foundation topics of computing.	K1
1.2	Learn about different types of technology and techniques.	K1
1.3	Understand the fundamentals of system analysis.	K1
2	Skills :	
2.1	Students will be able to identify the core IT concepts in a range of current and emerging technologies and how to apply appropriate technologies to a range of tasks.	S1
2.2	Students will be able to recognize the essential issues related to information security, how to take precautions and use techniques and tools to defend against computer crimes.	S2
2.3	Students will be able to identify many of the key ethical, legal and social issues related to information technology and how to interpret and comply with ethical principles, laws, regulations, and institutional policies.	S2
3	Values:	
3.1	To understand the ethical responsibility when interacting with human.	V1
3.2	To work effectively and collaboratively in a teamwork setting.	V3
3.3	Applying self-learning and personal development skills in the use of various technology applications and tools.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to computer science	6
2	Introduction to computer engineering	3
3	Introduction to software engineering	3
4	Introduction to data science	3
5	Introduction to human computer interaction	3
6	Introduction to artificial intelligence	3
7	Introduction to Internet of things and robotics	3
8	Introduction to cyber security	6
Total		30

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	Understand foundation topics of computing.	Lecture, exercise, and group discussion	Quiz, exams, assignments
1.2	Learn about different types of technology and techniques.	Lecture, exercise, and group discussion	Quiz, exams, assignments
1.3	Understand the fundamentals of system analysis.	Lecture, exercise, and group discussion.	Quiz, exams, assignments.
2.0	Skills		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1	Students will be able to identify the core IT concepts in a range of current and emerging technologies and how to apply appropriate technologies to a range of tasks.	Lecture, Group discussion.	Exams, assignments.
2.2	Students will be able to recognise the essential issues related to information security, how to take precautions and use techniques and tools to defend against computer crimes.	Lecture, Group discussion	Exams, assignments.
2.3	Students will be able to identify many of the key ethical, legal and social issues related to information technology and how to interpret and comply with ethical principles, laws, regulations, and institutional policies.	Lecture, Group discussion	Exams, assignments.
3.0	Values		
3.1	Demonstrate responsibility, ethics, and effective teamwork.	Project, Discussion	Project
3.2	To work effectively and collaboratively in a teamwork setting.	Project, Discussion	Project
3.3	Applying self-learning and personal development skills in the use of various technology applications and tools.	Project, Discussion	Project

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Group Project	10	20%
2	Midterm Exam	5	20%
3	Final Exam	11	60%

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

E. Student Academic Counseling and Support

Activate an academic guidance committee in each department and use different methods of communication through various communication channels such as e-mail and virtual classes. As well as, Instructors allocate four office hours per week for students' consultation.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ul style="list-style-type: none"> Panwar, S. S. (2019) <i>Introduction to Computer Information Systems</i>. Arcler Press.
Essential References Materials	<ul style="list-style-type: none"> Cybersecurity: A Practical Engineering Approach (2022) Henrique. S Database Management System: An Evolutionary Approach (2022) Jagdish. P, Hitesh. S, Ravi. T and Avita. K

	<ul style="list-style-type: none"> Steinberg, e. and Sanghera, K., 2015. Introduction to Computer Information Systems 2nd Edition. 2nd ed. Kendall Hunt Publishing.
Electronic Materials	N/Y
Other Learning Materials	N/Y

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom, laboratories.
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show, Software.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	N/Y

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effective teaching, course contributions to enhancement of knowledge and skills for students	Lecturer and Student	Survey
Overall quality of course periodically	Course committee	Annual report
Overall quality and effectiveness of course contents, ILOs achievement, success rate	Program Coordinator	<ul style="list-style-type: none"> Survey Evaluation of test models Standard sample
Exams, projects, and assignments	Lecturer	Overall assessments
Course outcome	Student	Survey
Teaching and learning outcome	Student	Survey and Exam

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	30 May 2022



Course Title:	Elementary of Statistics and Probability
Course Code:	MTH1501
Program:	Bachelor of Data Science
Department:	Mathematical science
College:	Applied science
Institution:	Umm Al Qura University

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A. Course Identification

1. Credit hours:
2. Course type
a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 3 / 1st year
4. Pre-requisites for this course (if any): MTH1105 Introduction to Calculus
5. Co-requisites for this course (if any): Not applicable

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	Four hours/week	100%
2	Blended	0	0
3	E-learning	0	0
4	Distance learning	0	0
5	Other	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	40
2	Laboratory/Studio	0
3	Tutorial	10
4	Others (specify)	0
	Total	50

B. Course Objectives and Learning Outcomes

1. Course Description

This course provides an elementary introduction to probability, statistical theory and methodology with applications. It contains the most basic tools for a good initiation to statistical methods. The course helps the students to establish an outstanding theoretical background for their future professions.

2. Course Main Objective

Acquiring the basic knowledge and concepts of describing data statistically and elementary theory of probability.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	Knowledge and Understanding	

CLOs		Aligned PLOs
1.1	Define the concepts, principles and techniques in statistics and probability theory.	K1
1.2	Describe basic statistical methodology of data analysis including; graphs, descriptive statistics	K1
1.3	List the addition and the multiplication rules of probability.	K1
2	Skills :	
2.1	Develop connections within branches of statistics and between statistical analysis and other disciplines.	
2.2	Explain the counting rules.	
2.3	Estimate the population parameter by the statistic.	
2.4	Estimate the population parameter by the statistic.	
2.5	Diagram the sample space.	
2.6	Interpret the results of statistical problem and data analysis	
3	Values:	
3.1	Work independently and with groups for solving statistical problem.	V1
3.2	Use computer skills and library effectively.	
3.3	Apply the statistical skills in solving the life problems.	

C. Course Content

No	List of Topics	Contact Hours
1	Definition and general view of statistics and organization and presentation of statistical data.	2
2	Measures of central tendency (Mean, Median, Mode) of the simple data and the frequency distribution.	6
3	Measures of dispersion (The Range – The Variance and the standard deviation - Coefficient of variation) of the simple data and the frequency Distribution	6
4	Moments and Measure of Skewness and Kurtosis	5
5	Correlation measures and Simple Linear regression	6
6	Sample space and Events.	2
7	Counting Techniques (Fundamental basics, Addition Rule – Multiplication Rule- Permutation and Combinations)	5
8	Definition of the probability and its applications	2
9	Conditional probability - Independence of events and Bayes theorem and its applications	6
Total		40

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	Define the concepts, principles and techniques in statistics and probability theory.	Lecture and Tutorials	Exams, quizzes
1.2	Describe basic statistical methodology of data analysis		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	including; graphs, descriptive statistics.		
1.3	List the addition and the multiplication rules of probability.		
2.0	Skills		
2.1	Develop connections within branches of statistics and between statistical analysis and other disciplines.	Lecture /individual or group work	Exams, quizzes
2.2	Explain the counting rules.		
2.3	Estimate the population parameter by the statistic.		
2.4	Estimate the population parameter by the statistic.		
2.5	Diagram the sample space.		
2.6	Interpret the results of statistical problem and data analysis.		
3.0	Values		
3.1	Work independently and with groups	Lecture/ individual or group work	Exams, quizzes
3.2	Use the computer skills and library effectively.		
3.3	Apply the statistical skills in solving the life problems.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First periodical exam	Sixth week	30%
2	Quizzes and homeworks	During semester	20%
3	Final exam	End of semester	50%

*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 :

All faculty members are required to be in their offices outside teaching hours .Each member allocates at least 4 hours per week to give academic advice to students and to better explain the concepts seen during the lectures.

Students are required to complete the homework problems .Students are welcome to work together on homework .However ,each student must turn in his or her own assignments ,and no copying from another student's work is permitted .Deadline extensions for homework will not be given .Students are encouraged to discuss with professor about homework problems.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Bluman, A. G. (2017). <i>A Brief Version: Elementary Statistics: A Step by Step Approach</i> . McGraw-Hill Education: tenth edition, ISBN: 1259755339
Essential References Materials	Probability and statistics for engineers and scientists, Ronald E. Walpole, Prentice Hall (2012).
Electronic Materials	None
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Large classrooms that can accommodate more than 30 students
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)	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment ^[SEP]	Students	Direct
Quality of learning resources	Students	Direct
Extent of achievement of course learning outcomes	Faculty Member	Direct

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	30 May 2022

Year 2 – Level 4

Course Title:	Introduction to Data Science
Course Code:	DS2101
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input type="checkbox"/> Others <input checked="" type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 2 nd Year / Level 4
4. Pre-requisites for this course (if any):
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	% 100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

This Introduction to Data Science course will survey the foundational topics in data science, namely such as, Data Science life cycle, Data Engineering, Data Analysis with Statistics and Machine Learning, and working with Big Data. The class will focus on breadth and present the topics briefly instead of focusing on a single topic in depth. This will give you the opportunity to sample and apply the basic techniques of data science.

Students will develop understanding of data science technologies and techniques by completing hands-on assignments focused on real-world data and addresses the social consequences of data analysis and application.

2. Course Main Objective

1. Explain the importance of Data Science and be able to formulate a data problem statement that is clear and concise.
2. Understand the difference between Data Science and Data Engineering life cycles.

3. Recognize appropriate tools and technology to collect, process, transform, summarize, and visualize data.
4. Understand how we can use data science in different problems and fields.
5. Identify privacy issues and ethical considerations when uses individuals' data.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Identify and describe the methods and techniques commonly used in data science.	K1
1.2	Demonstrate proficiency with the methods and techniques for obtaining, organizing, exploring, and analyzing data.	K1
2	Skills:	
2.1	Recognize how data preparation, analysis, inferential statistics, modeling, and machine learning can be utilized in an integrated capacity.	S3
3	Values:	
	Work in groups to discuss data science case studies problems and solutions.	V3
	Demonstrate own learning and professional development.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction: Data-Analytic Thinking <ul style="list-style-type: none"> • The Ubiquity of Data Opportunities • Data Science, Engineering, and Data-Driven Decision Making • Data Processing and “Big Data” • Data and Data Science Capability as a Strategic Asset • Data-Analytic Thinking 	3
2	Introduction to Data Science <ul style="list-style-type: none"> • What is Data Science? • Importance of Data Science • Business Intelligence and Data Science • Prerequisite for Data Scientist • Components of Data Science • Tools and Skills • Data Science Life Cycle 	3
3	Data Engineering for Data Science <ul style="list-style-type: none"> • What is Data Engineering? • Data Engineering Skills and Activities • Data Engineering Life Cycle • Data Engineering vs. Data Science • The Major Undercurrents Across the Data engineering Lifecycle 	3
4	Designing Good Data Architecture <ul style="list-style-type: none"> • What is Data Architecture? • Major Architecture Concepts and Components • Examples & Types of Data Architecture 	3
5	Data Modeling and Analytics Techniques and Technologies <ul style="list-style-type: none"> • Analytics for Data Science 	6

	<ul style="list-style-type: none"> • Data Analytics Examples • Statistics • Databases Querying for Data Sciences • Data Warehousing • Regression Analysis • Data Science Methods and Machine Learning • Data Analytics and Text Mining • Answering Business Questions with These Techniques 	
6	Data Science Tasks and Techniques <ul style="list-style-type: none"> • Co-occurrences and Associations: Finding Items That Go Together • Profiling: Finding Typical Behavior • Link Prediction and Social Recommendation • Data Reduction, Latent Information, and Movie Recommendation • Bias, Variance, and Ensemble Methods • Data-Driven Causal Explanation and a Viral Marketing Example 	3
7	Platforms for Data Science <ul style="list-style-type: none"> • Data Science Tool: Python, R, and MATLAB • Data Science Visualizations Tools • Data Science and Cloud Tools • Data Science and Big Data Tools 	3
8	Data Science and Business Strategy <ul style="list-style-type: none"> • Thinking Data-Analytically • Achieving and Sustaining Competitive Advantage with Data Science • Attracting and Nurturing Data Scientists and Their Teams • Be Ready to Accept Creative Ideas from Any Source • Be Ready to Evaluate Proposals for Data Science Projects • Examine Data Science Case Studies • Case Study: Applying the Fundamental Concepts of Data Science to a New Problem 	3
9	Human Factors and Data Science <ul style="list-style-type: none"> • What Data Can't Do: Humans in the Loop • Privacy, Ethics, and Mining Data About Individuals • Is There More to Data Science? 	3
Total		30

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	Gives knowledge and concepts of data science	Lectures	Exam
1.2			
...			
2.0	Skills		
2.1	Create and modify customizable tools for data analysis and visualization per the evaluation of characteristics of the data and the nature of the analysis	Lectures Discussions	Exam Oral presentation

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2			
...			
3.0	Values		
3.1	Demonstrate the ability to clean and prepare data for analysis and assemble data from a variety of sources	Lectures	Exam

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	25%
2	Midterm	6	15%
3	Final exam	13	60%

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Fundamentals of Data Science, 2021, 1 st edition, by Sanjeev J. Wagh, Manisha S. Bhende, Anuradha D. Thakare. Chapman and Hall/CRC. ISBN: 9781138336186
Essential References Materials	<ul style="list-style-type: none"> Data Science for Business, 2013, 1st edition, by Foster Provost, Tom Fawcett. O'Reilly Media, Inc. ISBN: 9781449361327 Fundamentals of Data Engineering, 1st edition, 2022, by Joe Reis, Matt Housley. O'Reilly Media, Inc. ISBN: 9781098108304
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms, laboratories
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Program leaders	Direct
Extent of achievement of course learning outcomes	Faculty	Indirect
Quality of learning resources	Faculty	Direct

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	30 May 2022

Course Title:	Applied Statistics for Data Science
Course Code:	DS2111
Program:	Bachelor of Science in Data Science
Department:	Information Science
College:	Computer Science and Information systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours:	3
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	Second year / Level 4
4. Pre-requisites for this course (if any):	Principles of Statistics and Probability
5. Co-requisites for this course (if any):	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	-
4	Others (specify)	-
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course covers the following topics: advanced topics of probability theory and statistical inference used in data science; Probabilistic models, multi-variate random variables, useful distributions, expectations, law of large numbers, Statistical inference, point and confidence interval estimation, hypothesis tests, linear regression. The course will also focus on different types of quantitative research methods and statistical techniques for analyzing data. Then, we will explore a range of statistical techniques and methods using the open-source statistics language, R.

2. Course Main Objective

The student should be able to:

1. Demonstrate understanding of the value of statistics and testing problems.
2. Demonstrate understanding of quantitative research methods and statistical inferences for analyzing data.
3. Use statistical algorithms for solving binomial and exponential methods.
4. Apply statistical programming tools to solve real-world problem

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Draw appropriate statistical conclusions about populations based on confidence estimates or based on hypotheses testing.	K2
1.2	Explain similarities/differences of statistical inferences based on confidence intervals and those based on hypothesis testing.	K2
1.3		
2	Skills:	
2.1	Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.	S1
2.2	Apply the principles of correlation, regression, analysis of variance, and hypothesis testing to solve practical problems and making decisions	S1
2.3		
2...		
3	Values:	
3.1	Use statistical and professional tools to communicate ideas and solutions to other.	V2
3.2	Work together in groups to solve various statistical problems, related to real-world situations.	V3
3.3		

C. Course Content

No	List of Topics	Contact Hours
1	Review of probability: axioms, rules, and approximation	4
2	Multivariate random variables	4
3	Correlation and exploration of multi-variables	4
4	selection ,random selection ,Bias :Random sampling and sample bias bias	4
5	Sampling distribution of the sample mean; Student t-distribution and percentiles of the t Statistic. Sampling distribution of the sample variance and of the sample proportion; Percentiles of the sample mean, sample variance and sample proportion from their respective sampling distributions. The distribution of the difference between two sample means and two sample proportions. The distribution of the ratio of two sample variances and the F distribution.	4
6	Null and alternative hypotheses. One-and two-sided tests. Type I and Type II errors. Estimation (point/interval) and testing Hypothesis for the population mean, proportion and population variance (large and small samples); P-value. Determining the sample sizes for estimating the population mean and the population proportion.	4
7	Estimation (point/interval) and hypothesis testing for the difference between two population means using large and small samples.	4
8	Estimation and hypothesis testing for the difference between two population proportions and for the ratio of two population variances	4

	using data from two independent samples. Matched-pair comparisons (estimation and testing)	
9	Parametric and non-parametric tests of difference	4
10	Statistical techniques and methods using the open-source statistics language, R language	4
Total		40

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	Draw appropriate statistical conclusions about populations based on confidence estimates or based on hypotheses testing.	Presentations, Discussion	Exams
1.2	Explain similarities/differences of statistical inferences based on confidence intervals and those based on hypothesis testing.	Brainstorming, Conclusions, Presentations	Exams
1.3			
2.0	Skills		
2.1	Apply statistical analysis in decision making.	Presentations, Practical Training, Self-learning, Group Activity	Exams. Training Evaluation Form
2.2	Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.	Presentations, Practical Training, Self-learning, Group Activity	Exams, Training Evaluation Form
2.3	Apply the principles of correlation, regression, analysis of variance, and hypothesis testing to solve practical problems	Presentations, Practical Training, Self-learning, Group Activity	Exams, Training Evaluation Form
3.0	Values		
3.1	Use statistical and professional tools to communicate ideas and solutions to other.	Discussion	Notes
3.2	Work together in groups to solve various statistical problems, related to real-world situations.	Self-learning, Group Activity	Notes
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	20%
2	Midterm Exam	6	15%
3	Labs	5	25%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
4	Final Exam	13	40%
5			
6			

*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 :

- Weekly office hours
- Staff Email

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Practical Statistics for Data Scientists: 50 Essential Concepts ISBN-13: 978-1491952962 • Peter Bruce and Andrew Bruce O'Reilly Media 2017
Essential References Materials	
Electronic Materials	
Other Learning Materials	R for Data Science: Import, Tidy, Transform, Visualize, and Model Data ISBN-13: 978-1491910399 Hadley Wickham and Garrett Grolemund O'Reilly Media 2017

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> • Classrooms • Laboratories
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> • Data show • Smart Board • Software • Computers
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Relevance of Scientific Content	Students, Faculty, Peer Reviewer	Questionnaire
Effectiveness of Teaching Methods & Strategies	Students, Peer Reviewer	Questionnaire
Effectiveness of Assessment Methods	Students, Faculty, Peer Reviewer	Questionnaire
Extent of Achievement of Course Learning Outcomes	Faculty, Program Leaders	Tests
Quality of Learning Resources	Students, Faculty, Program Leaders	Tests, Interviews

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	May 30 2022

Course Title:	Hardware Software Interface
Course Code:	CEN2001
Program:	B.Sc. in Data Science
Department:	Department of Computer Engineering
College:	College of Computer and Information Systems
Institution:	Umm Al-Qura University

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2. Facilities Required.....	7
<u>G. Course Quality Evaluation</u>	7
<u>H. Specification Approval Data</u>	8

A. Course Identification

1. Credit hours: 4
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 2 nd Year / level 4
4. Pre-requisites for this course (if any): Computer Programming (2)
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	40	100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	40
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify): Office Hours	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

Examines key computational abstraction levels below modern high-level languages; number representation, assembly language, memory management, the operating-system process model, high-level machine architecture including the memory hierarchy.

2. Course Main Objective

At the end of this course, students should be able to:

- Describe the multi-step process by which a high-level program becomes a stream of instructions executed by a processor;
- Describe the basic organization of the memory hierarchy and the effect of its parameters on system performance;
- Trace the execution of assembly code (x86-64), map the assembly to high-level language constructs, and write simple pieces of assembly programs;
- Write (or rewrite) code to take advantage of the computer execution model to improve execution efficiency;
- Debug assembly programs using GDB;
- Explain the role of an operating system;
- Identify the design priorities present in technical systems, and how they relate to historical context.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Describe the multi-step process by which a high-level program becomes a stream of instructions executed by a processor;	K2
1.2	Describe the basic organization of the memory hierarchy and the effect of its parameters on system performance;	K2
1.4	Identify the design priorities present in technical systems, and how they relate to historical context.	K2
1.5	Explain the role of an operating system;	K2
2	Skills :	
2.2	Write (or rewrite) code to take advantage of the computer execution model to improve execution efficiency;	S1
2.2	Debug assembly programs using GDB;	S1
3	Values:	
1.1	Develop improved collaborative skills.	V3

C. Course Content: Hardware Software Interface

No	List of Topics	Contact Hours
1	Number representation and code	4
2	The Basics of Logic Design (logic gates, combinational logic)	6
3	Memory and data representation	4
4	Machine code and the C programming language	4
5	x86-64 assembly language	4
6	Procedures and stacks	4
7	Memory and caches	4
8	Operating system process model	4
9	Memory: virtual memory and memory allocation	6
Total		40

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	Describe the multi-step process by which a high-level program becomes a stream of instructions executed by a processor;	Lectures, discussions	Exams
1.2	Describe the basic organization of the memory hierarchy and the effect of its parameters on system performance;	Lectures, discussions	Exams
	Describe fundamental differences between Java and C;	Lectures, discussions	Exams
	Identify the design priorities present in technical systems, and how they relate to historical context.	Lectures, discussions	Exams
	Explain the role of an operating system;	Lectures, discussions	Exams
2.0	Skills		
2.1	Write C code using pointers to create and manipulate complex data structures;	Lab tutorials	Lab reports, programming assignments
	Write (or rewrite) code to take advantage of the computer execution model to improve execution efficiency;	Lab tutorials	Lab reports, programming assignments
	Debug small-ish C and assembly programs using GDB;	Lab tutorials	Lab reports, programming assignments
3.0	Values		
1.1	Develop improved collaborative skills.	Lab tutorials, discussions	Lab reports, programming assignments

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Programming assignments	Weekly	25
2	Homework	Biweekly	20
3	Mid-term Exam	5/6	15
4	Final project	12	15
5	Final Exam	12	25

*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 between 2-4 hours per week

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Computer Systems: A Programmer's Perspective, 3/E (CS:APP3e). Randal E. Bryant and David R. O'Hallaron, Carnegie Mellon University http://csapp.cs.cmu.edu/
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room (max 30 students) Computer lab (max 15 students) Internet connection
Technology Resources (AV, data show, Smart Board, software, etc.)	Overhead projector and smart board. Virtual machine that runs Linux operating system.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Teaching and assessment	Students	Indirect: a student-feedback form is distributed at the end of the course.
Achievement of CLOs	Instructor and Quality Assurance committee	Direct: analyze the grades of students in each assessment method to find out which CLOs are below 60%.

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course material	Instructor and curriculum committee	Indirect: course materials are regularly reviewed in order to keep it updated.

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	May 2022 30

Course Title:	<i>Calculus II</i>
Course Code:	<i>MTH2102</i>
Program:	<i>Bachelor of Data Science Bachelor of Computer and Network Engineering</i>
Department:	<i>Mathematics</i>
College:	
Institution:	Umm Al-Qura University

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1. Learning Resources	26
2. Facilities Required.....	27
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A. Course Identification

1. Credit hours: 4
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/> b. Required <input type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 1 st trimester of 2 nd year
4. Pre-requisites for this course (if any): Calculus
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	4	100%
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	4*10
2	Laboratory/Studio	-
3	Tutorial	-
4	Others (specify)	-
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

Calculus II builds on what has been presented in Calculus I by presenting the fundamental Theorem of Calculus, definite and indefinite integral. The course exposes students to different methods of integration, applications of integration, hyperbolic functions, improper integrals. The course also introduces sequences and series and explains convergence and divergence, convergence tests, Maclaurin and Taylor Series, and Power Series.

2. Course Main Objective

The main objective of Calculus II is to introduce Integral calculus which is an important part of calculus that is usually taught after differential calculus. In integral calculus we take the inverse process of the relationship between two quantities, known as Integration or Anti-Differentiation or Anti-Derivative. The most important application of integral calculus is to compute the area or volume. Students are expected to learn the fundamental concepts of definite and indefinite integrals; to understand the concept of integral of a function; to learn how to integrate algebraic, exponential, trigonometric, hyperbolic and logarithmic functions, as well as combination of these functions; to recognize the usefulness of integration in

applications; to understand the concept of integration and its relationship to differentiation; to grasp the Fundamental Theorem of Calculus. At the end of this course the student should: understand the fundamental concepts of calculus (definite and indefinite, Hyperbolic Functions, Integration by parts, Integrating Trigonometric, Trigonometric Substitution, Integrating Rational Functions by Partial Fractions, Sequences, Infinite Series, Convergence Tests, Maclaurin and Taylor Series) and apply the methods of calculus to solve real problems.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and understanding	
1.1	<i>Define indefinite and definite integrals, and recognize their applications.</i>	K1
1.2	<i>Recognize infinite sequences and series including maclurin and Tylor series and memorize their properties.</i>	K3
1.3	<i>Learn and understand all basic integration rules and techniques of integrations as well as all types of convergence test and recall it during solving the problems.</i>	K1,K3
2	Skills:	
2.1	<i>Evaluate areas and volumes of revolving by different methods; disks, washers and cylindrical shells.</i>	S1
2.2	<i>Implement appropriate rules and techniques to evaluate integrals</i>	S4
2.3	<i>Calculate infinite sums, apply appropriate test to determine convergence of infinite series and find maclurin and Tylor expansions for functions.</i>	S4
3	Values:	
3.1	<i>Demonstrate the ability to complete tasks independently or as a group.</i>	V3

C. Course Content

No	List of Topics	Contact Hours
1	<i>An Overview of the area problem, The indefinite integral, Integration by substitution, The definite integral, The fundamental theorem of calculus, Evaluating Definite Integrals by Substitution, Logarithmic and other functions defined by integrals.</i>	10
2	<i>Area between two curves, Volumes by Slicing; Disks and Washers, Volumes by Cylindrical shells, Length of a Plane Curve., Area of a surface of revolution, Hyperbolic Functions.</i>	10
3	<i>An overview of integration methods., Integration by parts., Integrating Trigonometric Functions., Trigonometric Substitution., Integrating Rational Functions by Partial Fractions., Improper Integrals</i>	10
4	<i>Sequences., Infinite Series., Convergence Tests, The Comparison, Ratio, and Root Tests., Alternating series, Maclaurin and Taylor Polynomials., Maclaurin and Taylor Series; Power Series.</i>	10
Total		40

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		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.1	Define indefinite and definite integrals, and recognize their applications.	Class lectures, brainstorming, solving problems and discussion.	Quizzes, exams, assignments
1.2	Recognize infinite sequences and series including maclurin and Tylor series and memorize their properties.	Class lectures, brainstorming, solving problems and discussion.	Quizzes, exams, assignments
1.3	Learn and understand all basic integration rules and techniques of integrations as well as all types of convergence test and recall it during solving the problems.	Class lectures, brainstorming, solving problems and discussion.	Quizzes, exams, assignments
2.0	Skills		
2.1	Evaluate areas and volumes of revolving by different methods; disks, washers and cylindrical shells.	Class lectures, brainstorming, solving problems and discussion.	Quizzes, exams, assignments, class participation
2.2	Implement appropriate rules and techniques to evaluate integrals	Class lectures, brainstorming, solving problems and discussion.	Quizzes, exams, assignments, class participation
2.3	Calculate infinite sums, apply appropriate test to determine convergence of infinite series and find maclurin and Tylor expansions for functions.	Class lectures, brainstorming, solving problems and discussion.	Quizzes, exams, assignments, class participation
3.0	Values		
3.1	Demonstrate the ability to complete tasks independently or as a group.	Class lectures, brainstorming, solving problems and discussion.	Assignments, class participation

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Exam	5th	20%
3	Class activities, Quizzes, Group project and / or assignments	3 rd , 6th and/or 8th	20%
4	Final Exam	12th	60%

*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 hour for students have been arranged: 6 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Howard Anton, Irl C. Bivens, and Stephen Davis, <i>Calculus</i> , 10th edition, Wiley, Inc. 2012.
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Essential References Materials	<i>Salas, Hille, and Etgen, Calculus, one and several variables, 9th Edition.</i> <i>James Stewart, Calculus, 5th Edition, Brooks / Cole, 2002.</i> <i>None</i>
Electronic Materials	<i>NA</i>
Other Learning Materials	<i>Lecture Notes</i>

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<i>Classroom</i>
Technology Resources (AV, data show, Smart Board, software, etc.)	<i>Data show or Smart Board</i>
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<i>None</i>

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
<i>Student Feedback on Effectiveness of teaching and assessment</i>	<i>Students</i>	<i>Courses Assessment survey</i>
<i>Evaluation of Teaching by the Instructor</i>	<i>Faculty</i>	<i>Courses Reports</i>
<i>Extent of achievement of course learning outcomes</i>	<i>Instructor</i>	<i>Post-Rubric and Course report</i>
<i>Periodically reviewing course effectiveness and planning for improvement</i>	<i>Course committee</i>	<i>Annual report</i>

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	

Year 2 – Level 5

Course Title:	Data Structures
Course Code:	DS2221
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 2 nd Year / Level 4
4. Pre-requisites for this course (if any): Computer Programming 2
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This course covers analysis, design, and implementation of fundamental data structures and engages students to use data structures as tools to algorithmically design efficient computer programs that will cope with the complexity of actual applications.

The course focuses on basic and essential topics in data structures, including array-based lists, linked lists, hash tables, recursion, trees such as binary trees, heaps, sorting algorithms, graphs, and traversal techniques such as depth-first-search and breadth-first-search.

Students will carry out several assignments, which will emphasize various aspects of data organization and manipulation process.

2. Course Main Objective

The objective of this course is to provide a detailed study of basic structures commonly used in data processing, implementation (in Java), and a comparative study of different sorting and searching techniques

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Understand the basic types for data structure, implementation and application.	K3
1.2	Know the strength and weakness of different data structures.	K1
2	Skills :	
2.1	Use appropriate data structure as a solution of different kind of problems.	S4
2.2	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.	S4
3	Values:	
3.1	Develop programming skills which require to solve given problem.	V3
3.2	Develop collaborating abilities to work with others to solve given problem.	V3

C. Course Content

No	List of Topics	Contact Hours
1	DS Overview Abstract Data Types	3
2	Dynamic Arrays and Linked Lists	6
3	Stacks and Queues	6
4	Hash Table	3
5	Introduction to Trees	3
6	Binary Tree	3
7	Search Trees	3
8	B-Tree	3
Total		30

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	Understand the basic types for data structure, implementation and application.	Lectures Assign open-ended questions	Homework assignments Exams and quizzes
1.2	Know the strength and weakness of different data structures.	Brainstorming	Problem class discussions
2.0	Skills		
2.1	Use appropriate data structure as a solution of different kind of problems.	Lectures Assign open-ended questions	Homework assignments Exams and quizzes
2.2	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.	Lectures Assign open-ended questions	Homework assignments Exams and quizzes
3.0	Values		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.1	Develop programming skills which require to solve given problem.	Lectures Assign open-ended questions	Homework assignments Exams and quizzes
3.2	Develop collaborating abilities to work with others to solve given problem.	Brainstorming	Problem class discussion

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	60%
2	Midterm Exam	6	15%
3	Assignments	2-11	25%
4			

*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 :

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Data Structures and Algorithms in Java, 2014, 6th Edition, By M. Goodrich, R. Tamassia, and M. Goldwasser. John Wiley and Sons, Inc. ISBN: 978-1118771334
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Foundations of Software Engineering
Course Code:	SE2102
Program:	Bachelor of Data Science
Department:	Information Systems
College:	Computer Science and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours:	3
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	4/2
4. Pre-requisites for this course (if any):	Computer Programming 2
5. Co-requisites for this course (if any):	N/Y

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3	100%
2	Blended	0	0
3	E-learning	0	0
4	Distance learning	0	0
5	Other	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	0
4	Others (specify)	0
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course offers core and fundamental knowledge of software engineering concepts. It provides the required information and covers the important terminologies to allow obtaining a broad knowledge in the field of software engineering.

2. Course Main Objective

The main objective of this course is to teach the students the basics terminologies in software engineering field. In addition, the course aims to provides the students with the essential skills to gather software requirements to detailed model and document the software concepts. Furthermore. It aims to allow students to broaden their knowledge of software evolution.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Identify the key terms and concepts of software engineering	K1, K2

CLOs		Aligned PLOs
1.2	Distinguish between different types of software development models	K2
1.3	Recognize the key software processes	K2
1.4	Compare different types of software requirements gathering techniques	K2
1.5	Comparison between different types of software modelling techniques	K2
2	Skills:	
2.1	Model software processes	S1
2.2	Design a software from gathered requirements	S2
3	Values:	

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Software Engineering	4
2	Software processes	4
3	Agile software development	4
4	Requirements engineering	4
5	System modeling	8
6	Architectural design	4
7	Design and implementation	8
8	Software testing	2
9	Software evolution	2
Total		40

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	Identify the key terms and concepts of software engineering	Lecture, exercise	Quiz, exams, assignments
1.2	Distinguish between different types of software development models	Lecture, exercise	Quiz, exams, assignments
1.3	Recognize the key software processes	Lecture, exercise	Quiz, exams, assignments
1.4	Compare between various types of software requirements gathering techniques	Lecture, exercise	Quiz, exams, assignments
1.5	Compare between various types of software modelling techniques	Lecture, exercise	Quiz, exams, assignments
2.0	Skills		
2.1	Model software processes	Lecture, Group discussion, tutorials	Exams, assignments, project
2.2	Design a software from gathered requirements	Lecture, Group discussion, tutorials	Exams, assignments, project
3.0	Values		
3.1			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments and Quizzes	4,6,9	10%
2	Group Project	10	10%
3	Midterm Exam	5	20%
4	Final Exam	11	60%

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

E. Student Academic Counseling and Support

Activate an academic guidance committee in each department and use different methods of communication through various communication channels such as e-mail and virtual classes. Furthermore, instructors allocate four office hours per week for students' consultation.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Software Engineering, 10th Edition, Ian Sommerville, 2018, ISBN-13: 978-9332582699
Essential References Materials	Software Engineering: A Practitioner's Approach , 7th Edition, Roger Pressman, 2017, ISBN-13: 978-9339212087..
Electronic Materials	N/A
Other Learning Materials	N/A

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom and Blackboard
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show and software
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
Effective teaching, course contributions to enhancement of knowledge and skills for students	Lecturer and Student	Survey
Overall quality of course periodically	Course committee	Annual report
Overall quality and effectiveness of course contents, ILOs achievement, success rate	Program Coordinator	<ul style="list-style-type: none"> • Survey • Evaluation of test models • Standard sample
Exams, projects, and assignments	Lecturer	Overall assessments
Course outcome	Student	Survey
Teaching and learning outcome	Student	Survey and Exam

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	

Course Title:	Operating Systems Fundamentals
Course Code:	CS2342
Program:	Bachelor of Data Science
Department:	Computer Science
College:	Computers and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 4
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 2 nd year / 5 th level
4. Pre-requisites for this course (if any): Hardware Software Interfaces
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

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

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	50

B. Course Objectives and Learning Outcomes

1. Course Description

In this course the student will study the basic concepts of operating systems (OS), the following concepts will be studied in this course: OS Overview (objectives, functions, evolution of OS, characteristics of modern OS), process description and control (process definition, process states, process description and process control), threads (definition, why use thread, relationship between processes and threads), microkernel (benefits of microkernel organization, microkernel design), uni-processor scheduling (types of scheduling, short term scheduling criteria, scheduling algorithms), memory management (memory management requirements, loading programs into main memory -fixed partitioning, dynamic partitioning, simple paging, simple segmentation-), virtual memory (paging, segmentation, combined paging and segmentation), operating system software (fetch policy, placement policy, replacement policy, resident set management, cleaning policy, load control), I/O management and disk scheduling (I/O devices, organization of I/O function, I/O buffering, disk I/O), and file management (file management system, file organization and access, file directories, secondary storage management).

2. Course Main Objective

Learn the basic concepts, roles, functions, and services of operating systems and hands-on skills on Linux systems.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Recognize differences between processes and threads.	K2
1.2	Compare various process/thread synchronization and scheduling methods.	K2
1.3	Recognize modern memory management techniques used in operating systems.	K2
1.4	Recognize structure/organization of modern file systems.	K2
1...		
2	Skills :	
2.1	Demonstrates an understanding of the Linux operating system commands.	S4
2.2	Demonstrate the understanding of process, threads, and their intercommunication.	S4
2.3	Demonstrate memory management issues including advance techniques of paging, segmentation, and virtual memory.	S4
2.4		
3	Values:	
3.1		
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Operating Systems concepts and structures	10
2	Process management and concurrency	10
3	Inter Process communication and deadlocks	10
4	I/O and Files Systems	10
5	Memory management	10
Total		50

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	Recognize differences between processes and threads.	Course lectures, tutorials, HomeWorks, term project	Quiz, Exam
1.2	Compare various process/thread synchronization and scheduling methods.	Course lectures, tutorials, HomeWorks, term project	Quiz, Exam
1.3	Recognize modern memory management techniques used in operating systems.	Course lectures, tutorials, HomeWorks, term project	Quiz, Exam
1.4	Recognize structure/organization of modern file systems.	Course lectures, tutorials, HomeWorks, term project	Quiz, Exam
2.0	Skills		
2.1	Demonstrates an understanding of the Linux operating system commands.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	Demonstrate the understanding of process, threads, and their intercommunication.	Lab coursework Lab Project	Midterm lab exam, Final Lab exam, project
2.3			
2.4			
3.0	Values		
3.1			
3.2			
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1,2	3,7	10%
2	Midterm	6	20%
3	Midterm lab	8	10%
4	Project	10	15%
5	Final Lab	11	15%
6	Final Exam	12	30%
7			
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:

All faculty members are expected to include three weekly office hours. These office hours are displayed in each faculty's schedule and communicated to students.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating Systems Concepts", 9th Edition", 2013 Wiley.
Essential References Materials	Operating Systems: Principles and Practice (2nd Edition), by Tom Anderson and Mike Dahlin. 2014 xv6: a simple, Unix-like teaching operating system , by Russ Cox, Frans Kaashoek, and Robert Morris.
Electronic Materials	Umm Al Qura e-learning system containing teaching resources (Slides, assignment papers, etc.)
Other Learning Materials	N/A

2. Facilities Required

Item	Resources
<p>Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>Lecture room with: * at least 30 seats * A data show projector connected to a PC preferably with Internet connection * sliding board PC Lab (at least 30 seats)</p>
<p>Technology Resources (AV, data show, Smart Board, software, etc.)</p>	<p>30 Linux/Windows PCs</p>
<p>Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	<p>A maintenance lab + A PC lab with various operating systems such as Linux windows etc.</p>

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student's feedback: instructor effectiveness in teaching and teaching methods. Effectiveness of support materials.	Students	Anonymous survey
Peer evaluation: course design and content.	Peers	Peer review
Self-evaluation: course design and content, teaching methods, assessment methods.	Instructor	Self-review report

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	

Course Title:	Database Fundamentals
Course Code:	CS2231
Program:	Bachelor of Data Science
Department:	Computer Science
College:	College of Computer and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 2 nd Year / Level 5
4. Pre-requisites for this course (if any): Computer Programming (2)
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	50	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	Total	50

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>From this class, students will learn how to store, manage, and access large-scale data using data management systems. Among many existing systems, our primary focus will be on relational database management systems (RDBMS) and structured query language (SQL).</p>
<p>2. Course Main Objective</p> <p>By the end of the quarter, students are expected to:</p> <ul style="list-style-type: none"> • Have a clear understanding of data models, in particular relational model. • Have a mastery of relational query languages. • Be able to create good table designs for RDBMS. • Be able to use DBMS's for real-world data analysis and application development.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	An ability to describe the differences between a relational database and flat file.	K1
1.2	An ability to model data set using ER and UML diagram and derive a relational schema from that diagram.	K1
1.3	An ability to understand the concept of normalization as it relates to database tables.	K1
2	Skills :	
2.1	An ability to design a relational database.	S4
2.2	An ability to create a relational database.	S4
2.3	An ability to formulate SQL statements for data manipulation.	S4
3	Values:	
3.1	Work effectively in a group.	V3
3.2		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Databases	2
2	Database Systems Concepts and Architecture	2
3	Database Design and Conceptual Data Modeling	2
4	Introduction to the Relational Model	2
5	The Relational Algebra	4
6	Data Modeling Using the Entity Relationship (ER) Model	5
7	Basics of Functional Dependencies and Normalization for Relational Databases	5
8	The Relational Algebra	5
9	SQL: Overview of the SQL Query Language and Data Definition Language	5
10	SQL: Data Manipulation Language	5
11	SQL: Join Expressions	5
12	SQL: Integrity Constraints	5
13	SQL: Views	3
Total		50

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	An ability to describe the differences between a relational database and flat file.	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Participations, quizzes, lab exercises, assignments, and exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	An ability to model data set using ER and UML diagram and derive a relational schema from that diagram.	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Participations, quizzes, lab exercises, assignments, and exams
1.3	An ability to understand the concept of normalization as it relates to database tables.	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Participations, quizzes, lab exercises, assignments, and exams
2.0	Skills		
2.1	An ability to design a relational database.	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Participations, quizzes, lab exercises, assignments, and exams
2.2	An ability to create a relational database.	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Participations, quizzes, lab exercises, assignments, and exams
2.3	An ability to formulate SQL statements for data manipulation.	Lectures, discussions, lab project-based tasks and assignments, self-test at the beginning of each lecture, and participation in solving examples	Participations, quizzes, lab exercises, assignments, and exams
3.0	Values		
3.1	Work effectively in a group	Lab exercises	Lab exercises
3.2			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Lab exercises	1-10	30%
2	Exams	1-10	70%
3			
4			
5			
6			
7			
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 :

Two office hours for each week of the course are designated for individual student consultations and academic advice.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Database System Concepts By: Avi Silberschatz, Henry F. Korth and S. Sudarshan
Essential References Materials	Modern Database Management By: Jeffrey A. Hoffer and Ramesh Venkataraman
	Fundamentals of Database Systems By: Ramez Elmasri , Shamkant B. Navathe Database Systems: The Complete Book By Héctor García-Molina, Jeffrey Ullman, and Jennifer Widom
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom & Laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	Relevant IDEs and database management systems Overhead projector and internet connection
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Direct and Indirect
Quality of learning resources	Faculty	Direct

Evaluation Areas/Issues	Evaluators	Evaluation Methods

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	

Course Title:	Data Collection and Wrangling
Course Code:	DS2212
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 2 nd Year / Level 5
4. Pre-requisites for this course (if any): Applied Statistics for Data Science
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course will introduce the basic principles of data collection and wrangling and prepares students for further courses in the data science curriculum. Students will learn skills and methods for data collection, data cleaning, data wrangling and transformation, in addition to exposing them to the ethical and social considerations of data collection.

2. Course Main Objective

The objective of this course is to develop students' skills required to obtain data from existing sources and manage new data collection systems, with the focus on value-driven data collection. Students should not only learn skills to collect data but also learn how to collect the right data to answer a research question or achieve a business goal, as well as learn how to clean up, aggregate, sample, reshape, and normalize data sets using different tools and techniques.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Identify basic methods and techniques used for data collection, cleaning and wrangling.	K1
1.2	Discuss ethical and social considerations of data collection.	K1
2	Skills:	
2.1	Collect, manipulate and wrangle data.	S4
2.2	Inferring new data from existing data.	S4
3	Values:	
3.1	Demonstrate ethical considerations of data collection.	V2
3.2	Enhance teamwork and leadership skills by working in groups to achieve the solutions to addressed exercises/projects.	V3
3.3	Demonstrate self-learning abilities to acquire new methods and techniques to deal with data.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to data collection and wrangling using R	4
2	Exploratory data analysis + Hands-on exploratory data analysis using R	8
3	Handling missing data	2
4	Reshaping and tidying data	2
5	Data scraping (Web scraping + API scraping)	8
6	Joins and aggregation (Pivots and groupby aggregation)	4
7	Inferring data and hypothesis testing	4
8	Causation, counterfactuals	4
9	Final Project Presentations	4
Total		40

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	Identify basic methods and techniques used for data collection and wrangling.	Lectures Discussions	HomeWorks and assignments Exams and quizzes Class discussions
1.2	Discuss ethical and social considerations of data collection.	Lectures Discussions	Homework assignments Exams and quizzes Class discussions
2.0	Skills		
2.1	Collect data from existing sources.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	Manipulate and wrangle data.	Lectures Labs Discussions	Homework and assignments Exams and quizzes Class discussions
2.3	Inferring new data from existing data.	Lectures Labs Discussions	Homework and assignments Exams and quizzes Class discussions
3.0	Values		
3.1	Demonstrate ethical considerations of data collection.	Lectures Labs Discussions	Homework and assignments Class discussions
3.2	Enhance teamwork and leadership skills by working in groups to achieve the solutions to addressed exercises/projects.	Lectures Labs Discussions	Homework and assignments Class discussions
3.3	Demonstrate self-learning abilities to acquire new methods and techniques to deal with data.	Lectures Labs Discussions	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	20
2	Lab	5	25
3	Mid-term Exam	6	15
4	Final Exam	13	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:

Office hours between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Principles of Data Wrangling, by by Joseph M. Hellerstein, Tye Rattenbury, Jeffrey Heer, Sean Kandel, Connor Carreras, 2017, O'Reilly Media, Inc. ISBN: 9781491938928
Essential References Materials	
Electronic Materials	University E-learning Platform

Other Learning Materials	
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2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom + lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Year 2 – Level 6

Course Title:	Algorithm Fundamentals
Course Code:	CS2315
Program:	Bachelor of Data Science
Department:	Computer Science
College:	Computer and Information Systems
Institution:	Umm Al Qura University

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A. Course Identification

1. Credit hours:	3
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	level 5/ 2 nd year
4. Pre-requisites for this course (if any):	
5. Co-requisites for this course (if any):	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	50	%100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	Total	50

B. Course Objectives and Learning Outcomes

1. Course Description

The course is structured to provide fundamental theoretical and practical knowledge of algorithms design and analysis, as well as addressing some key applications. Topics include introductory complexity, sorting and search algorithms, recurrence relations and recursion, randomization, string matching, and P and NP Problems. Analysis of algorithms is an essential part of this course including worst case, average case, and amortized analysis- with an emphasis on the close connection between the time complexity of an algorithm and the underlying data structures.

2. Course Main Objective

On successful completion of this course students will be able to:

- Explain fundamental computing algorithms
- Analyse algorithms and identify key algorithmic strategies
- Use algorithms to help solve programming problem in code.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Understand the fundamentals of algorithms design and analysis and some key applications algorithms.	K1, K3
1.2		
2	Skills :	
2.1	Compare the efficiency of various algorithms and to choose the most appropriate ones for a given application	S4
2.2	Design and implement efficient algorithms such as sorting and searching, string matching, etc.	S4
3	Values:	
3.1	To provide a thorough treatment of the concepts and design principles of contemporary Computer Algorithms and develop collaborating abilities to work with others to solve given problem.	V3
3.2		

C. Course Content

No	List of Topics	Contact Hours
1	An Introduction to Algorithmic Analysis	5
2	Time and Space Complexity	5
3	Sorting algorithms	10
4	Search algorithms	10
5	Recurrence Relations and Recursion	5
6	Randomization	5
7	String matching	5
8	P and NP Problems	5
Total		50

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	Understand the fundamentals of algorithms design and analysis and some key applications algorithms.	Lectures, discussions, lab exercises.	Quizzes, lab exercises, and exams
2.0	Skills		
2.1	Compare the efficiency of various algorithms and to choose the most appropriate ones for a given application	Lectures, discussions, lab exercises.	Quizzes, lab exercises, and exams
2.2	Design and implement efficient algorithms such as sorting and searching, string matching, etc.	Lectures, discussions, lab exercises.	Quizzes, lab exercises, and exams
3.0	Values		
3.1			
3.2			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Lab exercises	1-10	20%
2	Mid-term exam	5-6	15%
3	Project	11	15%
4	Final exam	11-12	50%

*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:

Two office hours each week of the course are designated for individual student consultations and academic advice.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	T. H. Cormen and C. E. Leiserson, Introduction to Algorithms, fourth edition. London, England: MIT Press, 2022.
Essential References Materials	M. H. Alsuwaiyel, Algorithms : design techniques and analysis. New Jersey: World Scientific, 2016.
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom & Laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	Overhead projector and smart board. Integrated Development Environment (e.g., NetBeans, Eclipse, JBuilder). Java Development Kit (JDK)
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Teaching and assessment	Students	Indirect: a student-feedback form is distributed at the end of the course.
Achievement of CLOs	Instructors and Quality Assurance committee	Direct: analyze the grades of students in each assessment method to find out which CLOs are below 60%.
Course material	Instructors and curriculum committee	Indirect: course materials are regularly reviewed in order to keep it updated.

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	

Course Title:	Research methods for Data Science
Course Code:	DS2301
Program:	Bachelor of Science in Data Science
Department:	Information science
College:	Computer Science and Information systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Second year/ Level 6
4. Pre-requisites for this course (if any): Introduction to Data Science
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended	-	
3	E-learning	-	
4	Distance learning	-	
5	Other	-	

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	-
3	Tutorial	-
4	Others (specify)	-
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

This course prepares students to the theory and practice of research methods in data science. It covers research design; qualitative and quantitative methods; research management and ethics. This course explains how to employ scientific research methods in a data-driven project. It covers the selection and application of research methods, data collection and analysis, and scientific writing.

2. Course Main Objective

- Recognize the different qualitative and quantitative research methods used in data science.
- Be introduced to ethical and societal issues related to data science research.
- Know how to formulate research questions.
- Produce scientific writing.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Learn about different scientific research methods.	K3
1.2	Understand the relationship between research questions and methodological approach.	K3
1.3	Discuss the ethics of scientific research.	K3
2	Skills:	
2.1	Apply the appropriate research method to resolve a data-driven problem.	S3
2.2	Use web-based tools to build online survey.	S4
2.3	Write scientific materials with references management.	S3
3	Values:	
3.1	Prove scientific research ethics in dealing with data sources.	V2
3.2	Carry out scientific research projects in collaboration with groups.	V1
3.3	Have engaged with the relevant academic literature on research methods.	V1
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Scientific research and data science	3
2	Steps to build a research project	3
3	Different types of scientific research methods	3
4	Unpacking a research paper	3
5	Surveys and Sampling	3
6	Interviews and Focus Groups	3
7	Scientific research in the digital environment	3
8	Data analysis	3
9	Prepare a research plan	3
10	Write scientific materials	3
Total		30

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	Learn about different scientific research methods.	Presentations, Discussion	Exams
1.2	Understand the relationship between research questions and methodological approach.	Brainstorming, Conclusions, Presentations	Exams
1.3	Discuss the ethics of scientific research.	Presentations	Exams
2.0	Skills		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1	Apply the appropriate research method to resolve a data-driven problem.	Presentations, Practical Training, Self-learning, Group Activity	Exams, Training Evaluation Form
2.2	Use web-based tools to build online survey.	Presentations, Practical Training, Self-learning, Group Activity	Exams, Training Evaluation Form
2.3	Write scientific materials with references management.	Presentations, Practical Training, Self-learning, Group Activity	Exams, Training Evaluation Form
3.0	Values		
3.1	Prove scientific research ethics in dealing with data sources.	Discussion	Notes
3.2	Carry out scientific research projects in collaboration with groups.	Self-learning, Group Activity	Notes
3.3	Have engaged with the relevant academic literature on research methods.	Self-learning, Group Activity	Notes

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	25%
2	Midterm	6	15%
3	Final	12	60%
4			
5	s		
6			
7			
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:

- Weekly office hours
- Staff Email

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Carlo N. Lauro (Ed.), Enrica Amaturro (Ed.), Maria Gabriella Grassia (Ed.), Biagio Aragona (Ed.), Marina Marino.(2017). 1 st . Data Science and Social Research: Epistemology, Methods, Technology and Applications (Studies in Classification, Data Analysis, and Knowledge Organization) . Springer. 312 P
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Essential References Materials	
Electronic Materials	UQU E-learning platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> • Classrooms • Laboratories
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> • Data show • Smart Board • Software • Computers
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Relevance of Scientific Content	Students, Faculty, Peer Reviewer	Questionnaire
Effectiveness of Teaching Methods & Strategies	Students, Peer Reviewer	Questionnaire
Effectiveness of Assessment Methods	Students, Faculty, Peer Reviewer	Questionnaire
Extent of Achievement of Course Learning Outcomes	Faculty, Program Leaders	Tests
Quality of Learning Resources	Students, Faculty, Program Leaders	Tests, Interviews

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	

Course Title:	Data Analysis 1
Course Code:	DS2313
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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2. Facilities Required.....	5
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<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 2nd Year / Level 6
4. Pre-requisites for this course (if any): Data collection and wrangling
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course will introduce the basic principles of data analysis and prepares students for further courses in data analysis and modeling. Students will learn about supervised vs. unsupervised data analysis algorithms, including linear and nonlinear regression, logistic regression, clustering, anomaly detection, principal component analysis, in addition to data analysis performance measures and applications.

2. Course Main Objective

The objective of this course is to expose students to different methods and techniques used for data analysis. Students will learn how to conduct data analytics using scientific methods, and make appropriate and powerful connections between quantitative analysis and real-world problems

3. Course Learning Outcomes

CLOs	Aligned PLOs
1	Knowledge and Understanding:

CLOs		Aligned PLOs
1.1	Identify appropriate analysis tools and techniques.	K1
1.2	Discuss the role of data analysis methods for solving real-world problems.	K2
1.3	Explain the difference between different methods and algorithms used for data analysis.	K3
2	Skills:	
2.1	Apply appropriate data analysis techniques to support problem solving and decision making.	S1
2.2	Show data interpretation abilities.	S4
3	Values:	
3.1	Demonstrate ethical considerations of data analysis.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Fundamentals of data analysis tasks and techniques: Supervised vs. unsupervised techniques	4
2	Data summarization and visualization	4
3	Linear and Nonlinear Regression	4
4	Classification	4
5	Logistic Regression	4
6	Clustering	4
7	Anomaly detection	4
8	Principal component analysis (PCA)	4
9	Evaluating and enhancing data analysis techniques: performance measures	4
10	Data analysis applications	4
Total		40

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	Identify appropriate analysis tools and techniques.	Lectures Discussions	HomeWorks and assignments Exams and quizzes Class discussions
1.2	Discuss the role of data analysis methods for solving real-world problems.	Lectures Discussions	Homework assignments Exams and quizzes Class discussions
1.3	Explain the difference between different methods and algorithms used for data analysis.	Lectures Discussions	Homework assignments Exams and quizzes Class discussions
2.0	Skills		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1	Apply appropriate data analysis techniques to support problem solving and decision making.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.2	Show data interpretation abilities.	Lectures Labs Discussions	Homework and assignments Exams and quizzes Class discussions
3.0	Values		
3.1	Demonstrate ethical considerations of data analysis.	Lectures Labs Discussions	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	20
2	Lab	5	25
3	Mid-term Exam	6	15
4	Final Exam	13	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:

Office hours between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Data Mining and Business Analytics with R, By Johannes Ledolter, Wiley, 2013, ISBN: 978-1-118-44714-7
Essential References Materials	An Introduction to Statistical Learning with Application in R, by Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani; Publisher: Springer (2013); ISBN-13: 978-1461471370
Electronic Materials	University E-learning Platform
Other Learning Materials	https://web.stanford.edu/~hastie/Papers/ESLII.pdf http://cran.r-project.org/manuals.html data.princeton.edu/R

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom + lab

Item	Resources
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Advanced Database Systems
Course Code:	DS2302
Program:	Bachelor of Science in Data Science
Department:	Information Science
College:	Computers and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 3 rd Year / Level 7
4. Pre-requisites for this course (if any): Database Fundamentals
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This course provides advanced database knowledge. It presents the basics of transactions, data mining and warehousing, query processing and optimization, database tuning, distributed and NoSQL databases

2. Course Main Objective

Design and execute advanced queries.

Describe components of database management systems.

Explain how queries are processed and simple query optimization techniques.

Understand advanced data modelling e.g. object oriented, distributed database, XML, data warehousing and data mining and the supporting theoretical foundation.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Design and execute advanced queries	K1

CLOs		Aligned PLOs
1.2	Understand advanced data modelling	K1
1.3	Explain how queries are processed and simple query optimization techniques	K1
1...		
2	Skills :	
2.1	Implements query optimization techniques	S1
2.2	Convert database models to a Relational Database Model	S4
2.3		
2...		
3	Values:	
3.1	Work effectively in a group.	V3
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Normalization	3
2	The Enhanced Entity-Relationship (EER) model	5
3	Transactions: failures, atomicity, consistency, isolation, durability	8
4	Query Processing and Query Optimization Techniques	8
5	Database Backup and Recovery	5
6	Object and Object-Relational Databases	5
7	Indexing	6
Total		40

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	Design and execute advanced queries	Lectures, lab, discussions	Assignments, Quizzes, Exams
1.2	Understand advanced data modelling	Lectures, lab, discussions	Assignments, Quizzes, Exams
...	Explain how queries are processed and simple query optimization techniques	Lectures, lab, discussions	Assignments, Quizzes, Exams
2.0	Skills		
2.1	Implements query optimization techniques	Lectures, lab, discussions	Assignments, Exams
2.2	Convert database models to a Relational Database Model	Lectures, lab, discussions	Assignments, Exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
...			
3.0	Values		
3.1	Solve a database related problem using the learned concepts through group collaboration.	Lectures, lab, discussions	Assignments, Exams
3.2			
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	20
2	Lab	5	25
3	Mid-term Exam	6	15
4	Final Exam	13	40
5			
6			
7			
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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems," Addison Wesley, 5th Edition, 2006, ISBN-13: 978-0-32-136957-4
Essential References Materials	
Electronic Materials	SQL Server (e.g. MS SQL Server, MySQL), data show
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms, laboratories
Technology Resources	Datashow, SQL server, internet connection

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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students Feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Computer Networking
Course Code:	CEN2003
Program:	Bachelor of Data Science
Department:	Computer Engineering and Networking
College:	Computers and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours:	4
2. Course type	
a.	University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	2 nd year / 6 ^h level
4. Pre-requisites for this course (if any):	Operating Systems Foundations
5. Co-requisites for this course (if any):	

6. Mode of Instruction (mark all that apply)

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

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description

This course provides the fundamentals of computer networking. It covers topics related to network layered architectures including: connectivity, topology, TCP/IP and OSI models. At the Application Layer students first learn application layer principles and core application protocols and then go on to discuss the Quality of Service requirements for business applications and their implications on network requirements. At the Transport Layer it covers TCP and UDP protocols, operating principles, congestion control, error control and flow control. For Network Layer, it covers network service models, forwarding and routing, and IP addressing, and network design and development for different sized business organizations.

For Data Link Layer, it covers framing, switching and forwarding techniques, LAN addressing and ARP.

For Physical Layer, it introduces the essential elements of transmission media including analogue and digital signals, time and frequency domains concepts, and types of channels.

Students will be trained on the practical aspects of infrastructure solutions in network design and development for business organizations through hands-on exercises on device configuration including Cisco switches and routers. Popular simulation software including Cisco Packet Tracer and Wireshark are used for the analysis of network traffic and protocol behavior within the context of a business organization.

2. Course Main Objective

Learn and practice networks operations, components, layers, protocols, services, applications, tools and network security.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Describe the essential elements, components and functioning of data communication systems, network protocols and communication media in computer networks.	K3
1.2		
1.3		
1...		
2	Skills :	
2.1	Identify the IP addressing requirements for a business organization	S5
2.2	Design an IP based network for a business organization.	S5
2.3	Evaluate the applicability of IT infrastructure, network security solutions and network technologies for a business organization.	S5
2.4	Assess different networking scenarios using network software	S5
2.5	Analyze business application type traffic QoS requirements.	S5
3	Values:	
3.1		
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Network layering, and protocols, OSI and TCP/IP Model	6
2	Principles of Application layer: core Internet application protocols: FTP, SMTP, DNS.	6
3	Introduction to Transport layer protocols. Principles of reliable transfer, TCP reliable transfer implementation and management, RTT and timer, flow control. Principles of congestion control, TCP performance (response time, TCP throughput)	6
4	Network Design for different sized Business Organizations, Using public networks for secure data transport: VPNs	6
5	Introduction to network layer. Inside a router	6
6	Network layer: IP, IP addressing and routing, IPV6	6
7	LAN addressing	6
8	Data link layer: Ethernet	6
9	Physical layer: wired and wireless connectivity	6
10	Network performance requirements for Business application software: HTTP, Web Caching and content delivery networks. Peer-to-peer applications.	6
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 and Understanding		
1.1	Describe the essential elements, components and functioning of data communication systems, network protocols and communication media in computer networks.	Course lectures, tutorials, HomeWorks, term project	Quiz, Exam
1.2			
...			
2.0	Skills		
2.1	Identify the IP addressing requirements for a business organization	Lab coursework Lab Project	Midterm lab exam, Final Lab exam, project
2.2	Design an IP based network for a business organization.		
2.3	Evaluate the applicability of IT infrastructure, network security solutions and network technologies for a business organization.		
2.4	Assess different networking scenarios using network software		
2.5	Analyze business application type traffic QoS requirements.		
3.0	Values		
3.1			
3.2			
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quizzes	3,8	10%
2	Midterm	6	20%
3	Midterm lab	5	10%
4	Project	10	15%
5	Final Lab	11	15%
6	Final Exam	12	30%
7			
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:

All faculty members are expected to include three weekly office hours. These office hours are displayed in each faculty's schedule and communicated to students.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Computer Networking: A Top-Down Approach 7th Edition by James Kurose (Author), Keith Ross - 2021
Essential References Materials	1. S. Laan. IT infrastructure Architecture – Infrastructure Building Blocks and Concepts, Third Edition, 2017. ISBN 978-1-291-25079-5. 2. L. L. Peterson, B. S. Davie. Computer Networks: A Systems Approach, Fifth Edition, 2012. ISBN-13: 978-0123850591.
Electronic Materials	Umm Al Qura e-learning system containing teaching resources (Slides, assignment papers, etc.)
Other Learning Materials	N/A

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room with: * at least 30 seats * A data show projector connected to a PC preferably with Internet connection * sliding board PC Lab (at least 30 seats)
Technology Resources (AV, data show, Smart Board, software, etc.)	30 Linux/Windows PCs
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	A maintenance lab + A PC lab with various operating systems such as Linux windows etc.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student's feedback: instructor effectiveness in teaching and teaching methods. Effectiveness of support materials.	Students	Anonymous survey
Peer evaluation: course design and content.	Peers	Peer review
Self-evaluation: course design and content, teaching methods, assessment methods.	Instructor	Self-review report

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	
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Year 3 – Level 7

Course Title:	Data Analysis 2
Course Code:	DS 3114
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 3 rd Year / Level 7
4. Pre-requisites for this course (if any): Data analysis 1
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course will introduce advanced techniques to conduct thorough and insightful data analysis, and interpret the results correctly with detailed and useful information. Students will build on skills and knowledge acquired in previous data analysis courses and gain advanced skills to deal with real data-oriented problems.

2. Course Main Objective

The objective of this course is help students gain substantial understanding of the real problems; conduct deep data analytics using correct methods; and draw reasonable conclusions with sufficient explanation and elaboration.

3. Course Learning Outcomes

CLOs	Aligned PLOs
1	Knowledge and Understanding:

CLOs		Aligned PLOs
1.1	Discuss thoroughly the role of data analysis methods for solving real-world problems.	K2
1.2	Show deep understanding of the difference between different methods and algorithms used for data analysis.	K3
2	Skills:	
2.1	Apply appropriate techniques to analyze data and create value to support problem solving and decision making.	S1
2.2	Apply data analysis techniques to conduct research for real-world data science problems.	S3
2.3	Interpret data using different formats.	S4
3	Values:	
3.1	Demonstrate ethical considerations of data analysis.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Predictive data analysis: Naïve Bayesian analysis	4
2	Discriminant data analysis	4
3	Decision trees	4
4	Ensemble Methods: Bagging, Boosting, and Random Forests	4
5	Market Basket Analysis	4
6	Sentiment Analysis	4
7	Data analysis tools: Weka	8
8	Final Project Presentations	4
Total		40

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	Discuss thoroughly the role of data analysis methods for solving real-world problems.	Lectures Discussions	HomeWorks and assignments Exams and quizzes Class discussions
1.2	Show deep understanding of the difference between different methods and algorithms used for data analysis.	Lectures Discussions	Homework assignments Exams and quizzes Class discussions
2.0	Skills		
2.1	Apply appropriate techniques to analyze data and create value to support problem solving and decision making.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.2	Apply data analysis techniques to conduct research for real-world data science problems.	Lectures Labs Discussions	Homework and assignments Exams and quizzes Class discussions

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.3	Interpret data using different formats.	Lectures Labs Discussions	Homework and assignments Exams and quizzes Class discussions
3.0	Values		
3.1	Demonstrate ethical considerations of data analysis.	Lectures Labs Discussions	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	20
2	Lab	5	25
3	Mid-term Exam	6	15
4	Final Exam	13	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:

Office hours between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Data Mining and Business Analytics with R, By Johannes Ledolter, Wiley, 2013, ISBN: 978-1-118-44714-7
Essential References Materials	An Introduction to Statistical Learning with Application in R, by Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani; Publisher: Springer (2013); ISBN-13: 978-1461471370
Electronic Materials	University E-learning Platform
Other Learning Materials	https://web.stanford.edu/~hastie/Papers/ESLII.pdf http://cran.r-project.org/manuals.html http://data.princeton.edu/R

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom + lab
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show Smart board

Item	Resources
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Data Management and Warehousing
Course Code:	DS 3101
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information systems
Institution:	Umm Al-Qura University

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1. Learning Resources	26
2. Facilities Required.....	27
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A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 3 rd Year / Level 7
4. Pre-requisites for this course (if any):
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	% 100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

The course provides students with an overview of the key concepts for establishing a comprehensive data management strategy for a large organization, ensuring that its operational and analytical financial and accounting needs are efficiently, effectively, and securely addressed. The course will have an emphasis on real-case scenarios that companies face when addressing global operational and analytical data challenges.

Also, this course is designed to provide students with the knowledge and skills needed to acquire and curate real word data, to explore the data to discover patterns and distributions, and to manage large datasets with databases. Students will learn the minimal aspects of Python as needed to acquire and curate datasets. Much of their work will be done using Python libraries that deliver maximum benefit with minimal programming effort: to get data from various online data sources online, detect which aspects of data are uncrated or unreliable and understand why it is so, learn various domain independent and domain dependent ways to curate the data, and get the curated data into a form that can be explored, managed and analyzed. Students will also learn how to get datasets into database-ready form and do basic analysis of such datasets using relational databases and SQL, and NoSQL databases.

2. Course Main Objective

1. Students will gain an understanding of professional roles in managing research data.
2. Students will gain understanding of core research questions in data practice and policy.
3. Students will become familiar with the literature of data practices in information studies, social studies of science, and computer supported cooperative work.
4. Students will gain awareness of current and emerging data issues in national and international information policy.
5. Students will learn professional criteria for managing, selecting, and appraising data.
6. Students will learn to use and assess data collection, repositories, and services.
7. Students will gain technical skills in managing data in specific research settings.
8. Students will gain a basic knowledge of practices to curate digital data.
9. Students will learn steps involved in development of an enterprise data warehousing solution

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Explain the differences between data, information, and knowledge	K1
1.2	Demonstrate proficiency with the methods and techniques for obtaining, organizing, exploring, and analyzing data.	K1
1.3	Explain basic concepts: relational data model, non-relational data model, entity-relationship model, relational database design, relational algebra and the database language SQL	K1
1.4	Explain the ideas of distributed and NoSQL databases and contrast them to the relational model.	K1
2	Skills :	
2.1	Construct an algorithm for querying and filtering data based on predefined criteria	S4

CLOs		Aligned PLOs
2.2	Manage the process of collecting and representing data in a database	S4
2.3	Create database tables, and formulate database queries in SQL	S4
2.4	Experiment with data technologies such as big data and open data	S4
3	Values:	
3.1	Students will be able to describe relational database concepts and their relevance to information systems development and management.	V1
3.2	Students will be able to design/create a database using the entity relationship modeling technique	V1
3.3	Students will be able to manipulate a database using the SQL language.	V1
3.4	Students will be able to create various data queries relevant to functional areas and working with groups	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Data Management Knowledge discovery process	4
2	Data management plan (DMP)	4
3	DBMS theory	4
4	Data practices in the scientific domains Basic Concepts of Data Warehousing	4
5	Data warehousing- Online analytical processing (OLAP) and data mining <ul style="list-style-type: none"> Data cleaning and extract-transform 	4
6	Data sharing and reuse: Practice and policy	4
7	Data Warehousing Design	4
8	Data Warehouse modeling	4
9	Managing and Implementing a Data Warehouse Project <ul style="list-style-type: none"> Project Management Process, Scope Statement Work Breakdown Structure 	4
10	NoSQL Data Management	4
Total		40

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 differences between data, information and knowledge	Lectures	Exam
1.2	Demonstrate proficiency with the methods and techniques for obtaining, organizing, exploring, and analyzing data.	Lectures Laboratory	Exam Lab work

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	Explain basic concepts: relational data model, non-relational data model, entity-relationship model, relational database design, relational algebra and the database language SQL	Lectures Laboratory Discission	Exam Lab work
1.4	Explain the ideas of distributed and NoSQL databases and contrast them to the relational model	Lectures Laboratory Discission	Exam Lab work Quiz
2.0	Skills:		
2.1	Construct an algorithm for querying and filtering data based on predefined criteria	Lectures Laboratory Discission	Exam Lab work Quiz
2.2	Manage the process of collecting and representing data in a database	Lectures Laboratory Discission	Exam Lab work Quiz
2.3	Build a data model (entity-relationship model)	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz Oral presentation
2.4	Create database tables, and formulate database queries in SQL	Lectures Laboratory Discission	Exam Lab work Quiz
2.5	Experiment with data technologies such as big data and open data	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz
3.0	Values		
3.1	Students will be able to describe relational database concepts and their relevance to information systems development and management.	Discission Collaborative group project	Exam Lab work Quiz
3.2	Students will be able to design/create a database using the entity relationship modeling technique	Discission Collaborative group project	Exam Lab work Quiz
3.3	Students will be able to manipulate a database using the SQL language.	Discission Collaborative group project	Exam Lab work Quiz
3.4	Students will be able to create various data queries relevant to functional areas and working with groups	Discission Collaborative group project	Exam Lab work Quiz Oral pretentions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Lab Assessment	12	%25
2	Assignment	2-11	%20

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Midterm	6	%15
4	Final exam	13	%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 :

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Inmon, W.H., Rudin, K., Buss, C.K. and Sousa, R., 1998. <i>Data warehouse performance</i> . Wiley Publishing.
Essential References Materials	Fundamentals of Database Systems: 7th edition, Elmasri, R., Navathe, S.B., Elmasri, R. and Navathe, S.B., 2022.
Electronic Materials	http://www.uoitc.edu.iq/images/documents/informatics-institute/Competitive_exam/Database_Systems.pdf
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms and Laboratories
Technology Resources (AV, data show, Smart Board, software, etc.)	Smart Board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Program leaders	Direct
Extent of achievement of course learning outcomes	Faculty	Indirect
Quality of learning resources	Faculty	Direct

Evaluation Areas/Issues	Evaluators	Evaluation Methods

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	

Course Title:	Data Modeling 1
Course Code:	DS3122
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 3 rd Year / Level 7
4. Pre-requisites for this course (if any): Applied statistics for data science
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course will introduce the basic principles of data modeling. Students will learn skills and methods for data modeling including model selection and building, overfitting and underfitting, hyperparameter tuning and cross validation. Students will also learn about basic data modeling techniques including Deep Feedforward Networks and Convolutional Neural Networks (CNNs).

2. Course Main Objective

The objective of this course is to teach students about the appropriate tools and techniques for data modeling and give them a hands-on experience in building basic data models to solve real-world problems and also take the ethical considerations of building and using data models into account.

3. Course Learning Outcomes

CLOs	Aligned PLOs
1	Knowledge and Understanding:

CLOs		Aligned PLOs
1.1	Identify appropriate tools and techniques for data modeling.	K1
1.2	Demonstrate understating of the role of math and technology in building data models for a range of real-world problems.	K2
1.3	Compare and explain differences between different data modeling techniques.	K3
2	Skills:	
2.1	Apply appropriate mathematical, statistical and machine learning techniques for building data models.	S1
2.2	Develop research methods involving the use of data modeling techniques to solve real-world data science problems.	S3
2.3	Interpret and explain the output of data models.	S4
3	Values:	
3.1	Demonstrate ethical considerations of building and using data models.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Basic math and data modeling concepts	4
2	Introduction to using Python for Data modeling	8
3	Model selection and building: Linear vs. non-linear models	4
4	Gradient Descent and Stochastic Gradient Descent	4
5	Deep Feedforward Networks	4
6	Convolutional Neural Networks (CNNs)	4
7	Overfitting and Underfitting	4
8	Hyperparameter tuning	4
9	Cross-Validation	4
Total		40

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	Identify appropriate tools and techniques for data modeling.	Lectures Labs Discussions	HomeWorks and assignments Exams and quizzes Class discussions
1.2	Demonstrate understating of the role of math and technology in building data models for a range of real-world problems.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
1.3	Compare and explain differences between different data modeling techniques.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.0	Skills		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1	Apply appropriate mathematical, statistical and machine learning techniques for building data models.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.2	Develop research methods involving the use of data modeling techniques to solve real-world data science problems.	Lectures Labs Discussions	Homework and assignments Exams and quizzes Class discussions
2.3	Interpret and explain the output of data models.	Lectures Labs Discussions	Homework and assignments Exams and quizzes Class discussions
3.0	Values		
3.1	Demonstrate ethical considerations of building and using data models.	Lectures Labs Discussions	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	20
2	Lab	5	25
3	Mid-term Exam	6	15
4	Final Exam	13	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:

Office hours between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Deep Learning By Ian Goodfellow, 2016, MIT press, ISBN-13: 978-0262035613
Essential References Materials	Hands-On Machine Learning With Scikit-Learn, Keras, And Tensorflow: Concepts, Tools, And Techniques To Build Intelligent Systems by Aurélien Géron, Second edition, 2019, O'Reilly Media, Inc
Electronic Materials	University E-learning Platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom + lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Web Development Fundamentals
Course Code:	CS3251
Program:	Bachelor of Data Science
Department:	Computer Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours:	4
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	: Level 7 / 3 rd year
4. Pre-requisites for this course (if any):	Database Fundamentals
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	60	100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description		
This is an introduction to programming for the World Wide Web and the technologies that support it. The course is one part practical: you will learn how to use the tools and technologies to build websites. It's also one part theoretical: you'll learn how and why many of these technologies work. And it's one part creative: you'll get an opportunity to design and explore creative ways of building a website.		
2. Course Main Objective		
By the end of the course, you will be able to write a simple "full-stack" website with web pages, client-side code, server-side code, and a database, with a survey of other important web programming concepts and technologies.		
3. Course Learning Outcomes		
	CLOs	Aligned PLOs
1	Knowledge and Understanding	
1.1	Students learn how to build static web sites using HTML and CSS	K1
1.2	Students learn JavaScript to validate forms and to manipulate html elements	K1

CLOs		Aligned PLOs
1.3	Describe the architecture of client-side and server-side web applications.	K1
2	Skills :	
2.1	Build basic Web applications using HTML, CSS, and JavaScript to build the application front-end, and JavaServlet and JSP to build the application back-end.	S2
2.2	Be able to use different design programs.	S2
3	Values:	
3.1	Work effectively in a group.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Internet and Web Basics	3
2	HTML Basics	9
3	Cascading Style Sheets Basics	6
4	Introduction to JavaScript	6
5	Creating, Styling, and Validating Web Forms	6
6	HTTP and RESTful APIs	9
7	Server-side development	12
8	Connecting and interacting with databases	9
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 and Understanding		
1.1	Students learn how to build static web sites using HTML and CSS	Lectures, tutorial, labs	Quiz, lab evaluation, projects
1.2	Students learn JavaScript to validate forms and to manipulate html elements	Lectures, tutorial, labs	Quiz, lab evaluation, projects
1.3	Describe the architecture of client-side and server-side web applications.	Lectures, tutorial, labs	Quiz, lab evaluation, projects
2.0	Skills		
2.1	Build basic Web applications using HTML, CSS, and JavaScript to build the application front-end, and JavaServlet and JSP to build the application back-end.	Lectures, tutorial, labs	Quiz, lab evaluation, projects
2.2	Be able to use different design programs.	Lectures, tutorial, labs	Quiz, lab evaluation, projects
2.3			
3.0	Values		
3.1	Work effectively in a group.	Lab exercises	Lab exercises

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz	1-10	10

#	Assessment task*	Week Due	Percentage of Total Assessment Score
2	Lab exercises	1-10	30
4	Mid-term Exam	5-6	20
5	Final Exam	11-12	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:

Office hours between 2-4 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ul style="list-style-type: none"> Basics of Web Design: HTML5 & CSS, Terry Ann Felke-Morris, 6th edition, Pearson, ISBN-13: 9780137313303 The Full Stack Developer, Chris Northwood, Apress, ISBN-13: 978-1484241516
Essential References Materials	<ul style="list-style-type: none"> HTML5 and CSS3, Elizabeth Castro, Bruce Hyslop, 7th Edition, Peachpit Press, ISBN: 0321719611 JavaScript: The Definitive Guide, David Flanagan, 6th Edition, O'Reilly, ISBN: 0596805527 Java Servlet Programming, Jason Hunter, William Crawford, 2nd Edition, O'Reilly, ISBN: 0596000405 Robert Sebesta, Programming the World Wide Web, ISBN-10: 0132130815
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room Computer lab Overhead projector and internet connection
Technology Resources (AV, data show, Smart Board, software, etc.)	Windows 7 or 10 Visual Studio Code Netbeans Web browsers

Item	Resources
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Teaching and assessment	Students	Indirect: a student-feedback form is distributed at the end of the course.
Achievement of CLOs	Instructor and Quality Assurance committee	Direct: analyze the grades of students in each assessment method to find out which CLOs are below 60%.
Course material	Instructor and curriculum committee	Indirect: course materials are regularly reviewed in order to keep it updated.

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	

Course Title:	Project management in Data Science
Course Code:	DS3111
Program:	Bachelor of Science in Data Science
Department:	Information science
College:	Computer Science and Information systems
Institution:	Umm Al-Qura University

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G. Course Quality Evaluation	27
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A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 3rd year/ Level 7
4. Pre-requisites for this course (if any):
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended	0	0%
3	E-learning	0	0%
4	Distance learning	0	0%
5	Other	0	0%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	-
3	Tutorial	-
4	Others (specify)	-
	Total	30

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>The course introduces data-driven project management principles, tools and strategies, life cycle, risk assessment, and team management. It provides industrial methodology and concepts to manage step-by-step your data science project using appropriate methods and tools.</p>
<p>2. Course Main Objective</p> <p>The student should be able to:</p> <ol style="list-style-type: none"> 5. Plan end-to-end data science projects including activities involved, dependencies, external/internal resource needs and skills requirements 6. Manage stakeholder expectations on the delivery of data science projects 7. Manage data science team and ensure alignment to larger project/program objectives 8. Plan communications on status reporting of data science projects with details of all activities

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Understand and manage the data lifecycle	K1
1.2	Explains CRISP-DM methodology.	K1
1.3	Explains inputs and outputs of all activities helping effective project management of a data science project.	K1
2	Skills :	
2.1	Apply methodologies and techniques for harnessing data to create value	S4
2.2	Prepare dataset which would be used for achieving the business goal of the data science project.	S4
2.3	Lists the monitoring, reporting and user training needs during the execution of data science project.	S4
3	Values:	
3.1	Engage the right stakeholders to help setting data mining success criteria to achieve the business goals	V3
3.2	Conclude about the deployment of data management results and review of lessons learned.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to project management	3
2	Overview of main data science project management methodologies	3
3	Team definition: Solution architect, Project manager, Data engineer, Data scientist, Application developer, Project lead	3
4	Business understanding	3
5	Data understanding	3
6	Data preparation	3
7	Modeling	6
8	Evaluation	3
9	Deployment	3
Total		30

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	Understand and manage the data lifecycle	Presentations, Discussion	Exams
1.2	Explains CRISP-DM methodology.	Brainstorming, Conclusions, Presentations	Exams
1.3	Explains inputs and outputs of all activities helping effective project management of a data science project.	Brainstorming, Conclusions, Presentations	Exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	Skills		
2.1	Apply methodologies and techniques for harnessing data to create value	Presentations, Practical Training, Self-learning, Group Activity	Exams. Training Evaluation Form
2.2	Prepare dataset which would be used for achieving the business goal of the data science project.	Presentations, Practical Training, Self-learning, Group Activity	Exams, Training Evaluation Form
2.3	Lists the monitoring, reporting and user training needs during the execution of data science project.	Presentations, Practical Training, Self-learning, Group Activity	Exams, Training Evaluation Form
3.0	Values		
3.1	Engage the right stakeholders to help setting data mining success criteria to achieve the business goals	Discussion	Notes
3.2	Conclude about the deployment of data management results and review of lessons learned.	Self-learning, Group Activity	Notes
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	25%
2	Midterm Exam	6	15%
3	Final Exam	13	60%

*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 :

- Weekly office hours
- Staff Email

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Robert de Graaf, Managing Your Data Science Projects : Learn Salesmanship, Presentation, and Maintenance of Completed Models, Apress, 2019.
Essential References Materials	
Electronic Materials	UQU E-learning platform

Other Learning Materials	
---------------------------------	--

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> • Classrooms • Laboratories
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> • Data show • Smart Board • Software • Computers
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Relevance of Scientific Content	Students, Faculty, Peer Reviewer	Questionnaire
Effectiveness of Teaching Methods & Strategies	Students, Peer Reviewer	Questionnaire
Effectiveness of Assessment Methods	Students, Faculty, Peer Reviewer	Questionnaire
Extent of Achievement of Course Learning Outcomes	Faculty, Program Leaders	Tests
Quality of Learning Resources	Students, Faculty, Program Leaders	Tests, Interviews

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	

Year 3 – Level 8

Course Title:	Data Modeling 2
Course Code:	DS 3223
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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1.Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 3 rd Year / Level 8
4. Pre-requisites for this course (if any): Data modeling 1
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course will build on skills and concepts learned in previous data handling and modeling courses to help students develop advanced skills to build, evaluate, deploy, maintain data models to solve real-world data science problems.

2. Course Main Objective

The objective of this course is to introduce students to advanced data modelling techniques with hands-on experience on different data modeling steps including properties of data models, data models pipelines, model training and evaluation, model deployment and maintenance. Students will also learn about advanced data modeling techniques such as: linear factor models, generative models, and autoencoders.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Identify appropriate tools and techniques for advanced data modeling.	K1

CLOs		Aligned PLOs
1.2	Demonstrate understating of the role of math and technology in building data models for a range of real-world problems.	K2
1.3	Demonstrate deep understating of differences between different data modeling techniques.	K3
2	Skills:	
2.1	Apply appropriate mathematical, statistical and machine learning techniques for building advanced data models.	S1
2.2	Conduct research involving data modeling techniques for solving real-world data science problems.	S3
2.3	Interpret and explain the output of data models in different formats.	S4
3	Values:	
3.1	Demonstrate ethical considerations of building and using data models.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Properties and challenges of data models + Hands-on Machine Learning using Scikit-Learn	4
2	Building a pipeline + Hands-on Machine Learning using Keras, and TensorFlow	4
3	Sequence Modeling: Recurrent and Recursive Nets	4
4	Linear Factor Models	4
5	Generative Models	4
6	Autoencoders	4
7	Model Evaluation	4
8	Model Deployment	4
9	Model Serving, Monitoring, and Maintenance	4
10	Final Project Presentations	4
Total		40

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	Identify appropriate tools and techniques for advanced data modeling.	Lectures Labs Discussions	HomeWorks and assignments Exams and quizzes Class discussions
1.2	Demonstrate understating of the role of math and technology in building data models for a range of real-world problems.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
1.3	Demonstrate deep understating of differences between different data modeling techniques.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.0	Skills		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1	Apply appropriate mathematical, statistical and machine learning techniques for building advanced data models.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.2	Conduct research involving data modeling techniques for solving real-world data science problems.	Lectures Labs Discussions	Homework and assignments Exams and quizzes Class discussions
2.3	Interpret and explain the output of data models in different formats.	Lectures Labs Discussions	Homework and assignments Exams and quizzes Class discussions
3.0	Values		
3.1	Demonstrate ethical considerations of building and using data models.	Lectures Labs Discussions	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	20
2	Lab	5	25
3	Mid-term Exam	6	15
4	Final Exam	13	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:

Office hours between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Machine Learning Engineering By Andriy Burkov, 2020, True Positive Inc., ISBN-10: 1999579577 Deep Learning By Ian Goodfellow, 2016, MIT press, ISBN-13: 978-0262035613
Essential References Materials	Hands-On Machine Learning With Scikit-Learn, Keras, And Tensorflow: Concepts, Tools, And Techniques To Build Intelligent Systems by Aurélien Géron, Second edition, 2019, O'Reilly Media, Inc
Electronic Materials	University E-learning Platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom + lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Data Security
Course Code:	DS3232
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 4
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 3 rd Year / Level 8
4. Pre-requisites for this course (if any): Computer Networking
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	40
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course is a survey of the fundamental elements of data security and information assurance. Topics include confidentiality, integrity, and availability; threats and attack modes; cryptographic models; access control; identification and authentication; network security; operating systems security; database and cloud security; AI and ML security and privacy; intrusion detection and prevention systems.

2. Course Main Objective

The main objective of this course is to allow students to identify and understand the increasing threats to data, information, and information systems. Students will learn data security foundational principles

3. Course Learning Outcomes

CLOs	Aligned PLOs
1	Knowledge and Understanding:

CLOs		Aligned PLOs
1.1	Become able to explain various Data/Information security threat and controls for it.	K1
1.2	Become able to explain the usage of common key cryptography.	K1
1.3	Become able to explain the mechanism to protect confidentiality and integrity of data.	K1
2	Skills:	
2.1	Apply concepts of public keys, private keys, cryptosystem, authentication, digital signatures to secure simple systems.	S4
3	Values:	
3.1	Develop policies and procedures to manage enterprise security risks.	V1

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to data security CIA Traid of information security Threats, attacks, and assets Fundamental security design principles Security functional requirements Attack surfaces and attack trees Computer security strategy	4
2	Threats and Attacks Modes Types of malicious software (Malware) Denial-of-service attacks	4
3	Identification and Authentication Digital user authentication principles Password-based authentication Token-based authentication Biometric authentication Security issues for user authentication	4
4	Access Control Access control principles and policies	2
5	Cryptographic Tools and Algorithms Confidentiality with symmetric encryption Message authentication and hash functions Public-key encryptions Digital signatures and key management	4
6	Database, data center, and cloud security SQL injection attacks Database access control Inference Database encryption Data Center Security Cloud security concepts and approaches IoT security	4
7	AI and ML Security and Privacy Federated learning Homomorphic encryption	2
8	Software and Operating Systems Security Buffer overflow	4

	Software security issues and how to handle them Operating systems security: hardening and maintenance	
9	Network Security Internet security protocols and standards Internet authentication applications	4
10	Intrusion Detection and Prevention Systems Intrusion detection and analysis approaches Different intrusion detections systems Firewalls characteristics, access policy, and types Intrusion prevention systems	4
11	Information Security Management in Organizations Secure data storage.	4
Total		40

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	Become able to explain various Data/Information security threat and controls for it.	Lectures Assign open-ended questions Brainstorming	Homework assignments Exams and quizzes Problem class discussions
1.2	Become able to explain the usage of common key cryptography.	Lectures Assign open-ended questions Brainstorming	Homework assignments Exams and quizzes Problem class discussions
1.3	Become able to explain the mechanism to protect confidentiality and integrity of data.	Assign open-ended questions Brainstorming	Homework assignments Exams and quizzes Problem class discussions
2.0	Skills		
2.1	Apply concepts of public keys, private keys, cryptosystem, authentication, digital signatures to secure simple systems.	Case Study	Oral/written presentation
3.0	Values		
3.1	Develop policies and procedures to manage enterprise security risks.	Learning based on problem solving Encourage critical thinking	Oral/written presentation

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	60%
2	Midterm Exam	6	15%
3	Assignments	2-11	25%
4			

#	Assessment task*	Week Due	Percentage of Total Assessment Score
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 :

2-3 office hours per week

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Computer security, 4 th Edition, by William Stallings and Lawrie Brown. Pearson. ISBN: 978-0134794105.
Essential References Materials	Security and Privacy in Artificial Intelligence and Machine Learning — Part 1: Lay of the Land by Manish Prabhu Towards Data Science
Electronic Materials	University E-learning platform
Other Learning Materials	Information Security: Principles and Practices, 2nd Edition, By Mark S. Merkow and Jim Breithaupt. Pearson Education. ISBN: 978-0-7897-5325-0

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

Evaluation Areas/Issues	Evaluators	Evaluation Methods

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	

Course Title:	Principles and Techniques of Artificial Intelligence
Course Code:	AI2360
Program:	Bachelor of Data Science
Department:	Computer Science

College:	College of Computer and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 4
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 8 / 3rd year
4. Pre-requisites for this course (if any): Algorithms Fundamentals
5. Co-requisites for this course (if any): N/A

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	50	100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify):	
	Total	50

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>This course introduces the fundamental algorithms used in the field of AI. Students are introduced to the use of classical artificial intelligence algorithms and soft computing in AI related problems. Classical artificial intelligence algorithms include search techniques, knowledge representation, heuristic algorithms, rule-based systems etc. Soft computing algorithms include neural networks and fuzzy logic.</p>
<p>2. Course Main Objective</p> <ul style="list-style-type: none"> Understand the major areas and challenges of AI algorithms. Identify problems that can be solved by AI algorithms, and which AI algorithm may be suited to solving a given problem. Formalize a given problem in the language/framework of different AI methods. Implement basic AI algorithms and apply basic AI knowledge and algorithms to solve problems. Compare the difficulty of different versions of AI problems, in terms of computational complexity and the efficiency of existing algorithms.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Describe the basics of AI algorithms, intelligent agents and their different types and applications.	K2
1.2	Differentiate intelligent search algorithms including uninformed search, heuristic search, adversarial search that can be used in Game playing and other AI applications.	K2
1.3	Describe logical agents, first order logic, first order inference system and fuzzy logic.	K2
2	Skills :	
2.1	Use logical thinking and reasoning in the context of artificial intelligence to solve complex problems.	S1
2.2	Demonstrate skills in using software tools to solve the AI problems.	S2
2.3		
3	Values:	
3.1	Students will learn how AI can be used to serve the community.	V1
3.2	Demonstrate effective communication of their ideas to other students in the group and in the class.	V3

C. Course Content: Principles and Techniques of Artificial Intelligence

No	List of Topics	Contact Hours
1	Intro to AI (Concepts, Domains and Applications)	5
2	Intelligent Agents and Agent Environment	10
3	Problem Solving through intelligent search algorithms (Un-informed Search, Informed Search, and Local Search Algorithms)	10
4	Adversarial Search algorithms (Minimax Algorithm, Alpha Beta Pruning, Chance Minimax)	10
5	Logical Agents (knowledge-based agents, propositional logic, First Order Logic, Logic Programming)	10
6	Fuzzy Logic	5
Total		50

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	Students will learn basics of AI, Intelligent Agents and their different types and applications	Course lectures	Quizzes, Assignments, Midterm Exam
1.2	They will learn in detail different search techniques including uninformed search, heuristic search, adversarial search that can be used in	Course lectures, labs, tutorials, assignments, and a team project	Quizzes, Assignments, Midterm Exam, Final Exam, Project

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	Game playing and other AI applications		
1.3	Students will learn logical agents, first order logic, first order inference system and fuzzy logic	Course lectures, labs, assignments and a team project	Quizzes, Assignments, Midterm Exam, Final Exam, Project
1.4	Students will learn different neural network algorithms	Course lectures, labs, assignments and a team project	Quizzes, Assignments, Midterm Exam, Final Exam, Project
2.0	Skills		
2.1	Students will improve his/her logical thinking and reasoning in the context of artificial intelligence	Project, Assignments	Project, Assignments and Exams
2.2	Student will learn how to communicate their ideas to other students in the group and in the class	Encouragement to teach other students what you have learnt in the course	Project and Discussion
3.0	Values		
3.1	Students will learn how AI can be used to serve the community	Survey, research	Report and Discussion
3.2	Demonstrate skills in using software tools to solve the AI problems.	Project and Lab assignments	Project and Lab assignments

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Lab Assignment 1	3	5
2	Lab Assignment 2	4	5
3	Lab Assignment 3	6	5
4	Quiz 1	3	3.3
5	Quiz 2	5	3.3
6	Midterm	10	20
7	Lab Assignment 4	3	5
8	Lab Assignment 5	4	5
	Quiz 3	12	3.3
9	Lab Assignment 6	6	5
10	Project	15	10
11	Final	17-18	30

*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 between 2-4 hours per week

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Russell & Norvig, Artificial Intelligence: A Modern Approach 4rd Edition, 2020, Prentice Hall.
Essential References Materials	
Electronic Materials	Lecture slides.
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room (max 40 students) Computer lab (max 20 students) Internet connection
Technology Resources (AV, data show, Smart Board, software, etc.)	Overhead projector and smart board.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Teaching and assessment	Students	Indirect: a student-feedback form is distributed at the end of the course.
Achievement of CLOs	Instructor and Quality Assurance committee	Direct: analyze the grades of students in each assessment method to find out which CLOs are below 60%.
Course material	Instructor and curriculum committee	Indirect: course materials are regularly reviewed in order to keep it updated.

Evaluation Areas/Issues	Evaluators	Evaluation Methods

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	

Year 3 – Level 9

Course Title:	COOP
Course Code:	DS3388
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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A. Field Experience Identification

1. Credit hours: 8
2. Level/year at which this course is offered: 3rd year / 9 level and Summer term
3. Dates and times allocation of field experience activities. <ul style="list-style-type: none"> • Number of weeks: (18) week • Number of days: (90) day • Number of hours: (720) hour
4. Pre-requisites to join field experience (if any): Achieve credit of -hours

B. Learning Outcomes, and Training and Assessment Methods

1. Field Experience Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Identify appropriate data analysis tools to use based on coursework knowledge	K1
1.2	Use coursework to describe appropriate ways to deal with data exploration, manipulation, and/or management.	K1
1.3	Reproduce solutions for real-world problems using basic science, math, technology, and data analysis techniques.	K2, K3
1.4	Understand the concurrent data modeling and analysis used and differences between them.	K3
2	Skills:	
2.1	Use coursework knowledge to analyze data, generate insights, create value, and/or support problem solving and decision making.	S1
2.2	Design innovative solutions for practical real-world problems in different fields.	S2
2.3	Suggest an appropriate research method, analysis, and/or standard to deal with data problems in real-world	S3
2.4	The ability to describe data and show results using different oral, written, and visual techniques.	S4
2.5	Use coursework knowledge to apply the appropriate computational and technical tools to deal with different aspects of data.	S4
3	Values:	
3.1	Use coursework to suggest innovative ways to deal with data that can benefit the organization and society.	V1
3.2	Apply ethical principles and commit to professional ethics, responsibilities and norms of computer and data best practice.	V2
3.3	Communications with all team members and demonstrate leadership qualities.	V3
3.4	Demonstrate self and lifelong learning abilities.	V3

2. Alignment of Learning Outcomes with Training Activities and Assessment Methods

Code	Learning Outcomes	Training Methods/Activities	Assessment Methods
1.0	Knowledge and Understanding		

Code	Learning Outcomes	Training Methods/Activities	Assessment Methods
1.1	Identify appropriate data analysis tools to use based on coursework knowledge	Participation in meetings Hands-on projects	Weekly reports Final training discussion and report
1.2	Describe appropriate ways to deal with data exploration, manipulation, and/or management.	Participation in meetings Hands-on projects	Writing weekly reports Writing final report
1.3	Reproduce solutions for real-world problems using basic science, math, technology, and data analysis techniques.	Participation in meetings Hands-on projects	Writing weekly reports Writing final report
1.4	Understand the concurrent data modeling and analysis used and differences between them.	Participation in meetings Hands-on projects	Writing weekly reports Writing final report
2.0	Skills		
2.1	Use coursework knowledge to analyze data, generate insights, create value, and/or support problem solving and decision making.	Lecture and research activities Case studies Hands-on projects	Writing weekly reports Writing final report Evolution report
2.2	Design innovative solutions for practical real-world problems in different fields.	Lecture and research activities Case studies Hands-on projects	Writing weekly reports Writing final report Evolution report
2.3	Suggest an appropriate research method, analysis, and/or standard to deal with data problems in real-world	Hands-on projects Case studies Participation in meetings	Writing weekly reports Writing final report Evolution report
2.4	The ability to describe data and show results using different oral, written, and visual techniques.	Hands-on projects Case studies Participation in meetings	Writing weekly reports Writing final report Evolution report
2.5	Use coursework knowledge to apply the appropriate computational and technical tools to deal with different aspects of data.	Hands-on projects Case studies Participation in meetings	Writing weekly reports Writing final report Evolution report
3.0	Values		
3.1	Use coursework to suggest innovative ways to deal with data that can benefit the organization and society.	Participation in meetings Participation in projects	Evolution report
3.2	Apply ethical principles and commit to professional ethics, responsibilities and norms of computer and data best practice.	Participation in meetings Participation in projects	Evolution report
3.3	Communications with all team members and demonstrate leadership qualities.	Participation in meetings Participation in projects	Evolution report

Code	Learning Outcomes	Training Methods/Activities	Assessment Methods
3.4	Demonstrate self and lifelong learning abilities.	Participation in meetings Participation in projects	Evolution report
3.5			

3. Field Experience Learning Outcomes Assessment

a. Students Assessment Timetable

#	Assessment task*	Assessment timing (Week)	Percentage of Total Assessment Score
1	Academic supervisor visits	3-4	5
2	Academic supervisor visits	6-8	5
3	Field supervisor evaluation	9	10
4	Academic supervisor evaluation	10	10
5	Weekly reports	1-9	20
6	Final report and oral discussion	16	40
7	Summer training management	18	10
8			

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

b. Assessment Responsibilities

م	Category	Assessment Responsibility
1	Teaching Staff	Field visits, oral discussion, final report marking, weekly reports evolution/feedback
2	Field Supervisor	weekly report/feedback, final evaluation
3	Others (specify)	COOP training administration department evaluation (submitting requirements on time/submitting the survey/ register within registration duration)

C. Field Experience Administration

1. Field Experience Locations

a. Field Experience Locations Requirements

Suggested Field Experience Locations	General Requirements*	Special Requirements**
Location convenient access		
Software/hardware projects	learning sources information technology laboratories equipment	
Qualified communication and IT specialists available	learning sources equipment	CIT specialties
Safe and secure training site	equipment	safety standards

*Ex: provides information technology ,equipment ,laboratories ,halls ,housing ,learning sources ,clinics etc.

**Ex: Criteria of the training institution or related to the specialization, such as: safety standards, dealing with patients in medical specialties, etc.

b. Decision-making procedures for identifying appropriate locations for field experience

The field experience should be relevant to the students major
The training site should be approved by the COOP training administration
The field experience location should provide a private field supervisor for the students

The training site should deal and solve real-world problems in the IT field for both hardware and software

2. Supervisory Staff

a. Selection of Supervisory Staff

Selection Items	Field Supervisor	Teaching Staff
Qualifications	Computer Science/Data Science	Academic qualification
Selection Criteria	Experience in Data science field Available during the training time Response to the COOP training administration and academic advisors	Available during the whole training terms Response to students and COOP training administration

b. Qualification and Training of Supervisory Staff

(Including the procedures and activities used to qualify and train the supervisory staff on supervising operations, implementing training activities, the follow-up and evaluation of students, etc.)

3. Responsibilities

a. Field Experience Flowchart for Responsibility

including units, departments, and committees responsible for field experience, as evidenced by the relations between them.

--

b. Distribution of Responsibilities for Field Experience Activities

Activity	Department or College	Teaching Staff	Student	Training Organization	Field Supervisor
Selection of a field experience site	✓		✓		
Selection of supervisory staff	✓				
Provision of the required equipment				✓	✓
Provision of learning resources		✓		✓	✓
Ensuring the safety of the site		✓		✓	✓
Commuting to and from the field experience site			✓		
Provision of support and guidance		✓			✓
Implementation of training activities (duties, reports, projects,			✓		

Activity	Department or College	Teaching Staff	Student	Training Organization	Field Supervisor
Follow up on student training activities		✓			✓
Adjusting attendance and leave				✓	✓
Assessment of learning outcomes	✓	✓		✓	✓
Evaluating the quality of field experience	✓	✓		✓	✓
Others (specify)					

4. Field Experience Implementation

a. Supervision and Follow-up Mechanism

The field supervisor evaluates the student in the following areas:

- Punctuality and attendance
- Ability to apply and analyze
- Knowledge in area of specialization
- Desire to learn and gather information
- Cooperation with others
- Productivity
- Effective communication skills
- Ability to think creatively
- Follows the workplace policies and procedures
- Takes care of the work area and equipment
- The student's weaknesses during training
- The work that the student mastered during the training

b. Student Support and Guidance Activities

- COOP training guidance session
- COOP training managing unit availability during the year
- Academic supervisor regular visits
- Weekly discussions and feedback
- Final report feedback and guidance

5. Safety and Risk Management

Potential Risks	Safety Actions	Risk Management Procedures
Depends on the training site	Subject to the training site management	Subject to the training site management

G. Training Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods

Evaluation Areas/Issues	Evaluators	Evaluation Methods

Evaluation areas (e.g., Effectiveness of Training and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Supervisory Staff, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

E. Specification Approval Data

Council / Committee	
Reference No.	
Date	

Year 4 – Level 10

Course Title:	Probabilistic Decision Making and Risk Management
Course Code:	DS4115
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information systems
Institution:	Umm Al-Qura University

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1. Learning Resources	26
2. Facilities Required.....	27
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A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 10
4. Pre-requisites for this course (if any): Data Analysis 2
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	% 100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course will enable students to become power users of Excel and will show them how to build models of unstructured problems so they can make better decisions and gain insight into the impact various factors have on those decisions. The vehicle used for developing such models is the familiar spreadsheet. Students will learn the creative process of constructing and using spreadsheet models of problems, specifically how to design, build and test spreadsheets and workbooks, and how to improve the efficiency and effectiveness with which they are used. Topics are explored by learning how to solve a wide variety of problems in the construction industry, often using tools and techniques from the field of management science that are built-in to Excel. Students with the knowledge acquired in this course will provide their employers with a competitive advantage and will themselves enjoy a competitive advantage over their peers who lack these skills.

2. Course Main Objective

- Understand the basic concepts of risk analysis and the relationship between probability theory and modeling, risk analysis, and decision analysis
- Understand how to interpret probability and probabilistic modeling, in the evaluation of risk
- Learn how to understand and interpret the basic tools of risk analysis – fault trees, event trees, and simulation models
- Understand the issues surrounding the use of risk analysis in decision making

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Describe and critically assess the processes through which companies make decisions in risky environments.	K3
1.2	Compare risk of databases and their management.	K1
2	Skills:	
2.1	Choose, with respect to alternatives, appropriate risk management strategies.	S1
2.2	Assess the best strategies according to an available set of information and adapt appropriate strategies once a set of information changes.	S3
2.3	Create the most suitable set of information for the decision-making process.	S1
3	Values:	
3.1	Work both independently and in teams to create and manage financial strategies.	V3
3.2	Apply research skills into risk management problems and the application of these in business decision-making.	V1

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Risk Management and probabilistic descriptions <ul style="list-style-type: none"> • Decision Making and Risk Management – Introduction, Concept, Problem Definition and Framing. • Basic probabilistic descriptions • Rational Models of Decision Making • Types of Decisions, Steps in Decision Making Process • Why Rational Models Fail? Traps and Cognitive Barriers that Lead to Suboptimal Decisions. 	4
2	<ul style="list-style-type: none"> • Decision making Tools and Models <ul style="list-style-type: none"> ○ Decision Making ○ Avoiding Decision-Making Traps. ○ Intuition: Pros and Cons, Decisions Making for Corporate Management ○ Execution, and Operation of Projects ○ Role of Technology in Decision Making and Data Analysis. ○ Dealing with Conflict and Risk ○ Qualitative and Quantitative Risk Analysis ○ Decision Models in Strategic Management ○ Decision Making Systems. 	8

3	Fundamentals of decision analysis Formulating decision problems	4
4	Decision Making and Leadership <ul style="list-style-type: none"> • Role of Decision Making and Leadership • Definitions of Leadership and Followership • Motivational Theory • Common Motives of Leaders and Followers. • Identifying Resources that Affect your Power and Influence • Values as Underpinnings of Leadership. • Organizational Values in Decision • Making and Risk Management • Importance of Team Composition • Understanding your Own Value System • Organizational Values • Developing and Communicating your Own view of What Needs Changing or What is Possible to Avoid Risks. • Risk Communication 	8
5	Multi-attribute decision making	4
6	Tools for Decision Analysis: Analysis of Risky Decisions <ul style="list-style-type: none"> • Probabilistic Modeling • Decision making systems 	4
7	Applying decision analysis <ul style="list-style-type: none"> • Risk Assessment and risk perception • probabilistic risk assessment (PRA) 	4
8	Group decision making	4
Total		40

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	Describe and critically assess the processes through which companies make decisions in risky environments.	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz
1.2	Compare risk of databases and their management.	Lectures Laboratory Discission Collaborative group project	Exam Lab work
2.0	Skills		
2.1	Choose, with respect to alternatives, appropriate risk management strategies.	Lectures Laboratory Discission Collaborative group project	Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	Assess the best strategies according to an available set of information and adapt appropriate strategies once a set of information changes.	Lectures Laboratory Discission	Exam Lab work
...	Create the most suitable set of information for the decision-making process.	Lectures Laboratory Discission Collaborative group project	Exam Lab work
3.0	Values		
3.1	Work both independently and in teams to create and manage financial strategies.	Lectures Laboratory Discission Collaborative group project	Exam Lab work
3.2	Apply research skills into risk management problems and the application of these in business decision-making.	Lectures Laboratory Discission Collaborative group project	Exam Lab work

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignment	11-2	20%
2	Midterm	6	15%
3	Final exam	13	40%
4	Lab Assessment	12	25%

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Decision Making And Risk Management, 2021, By Dr. Sharad Kadam , Dr. Prashant Kalshetti , Dr. Palak Chhabiani Implementing Enterprise Risk Management, John Wiley & Son, Inc., Hoboken, New Jersey. 2017
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Essential References Materials	1. Clemen, R. and Reilly R. Making Hard Decisions with Decision Tools (Pacific Grove, CA: Duxbury). Chap. 3 “Structuring Decisions.” 2. Boardman, T. et al. Cost-Benefit Analysis: Concepts and Practice (Upper Saddle River, NJ: Prentice-Hall) 2001. Chapter 1.
Electronic Materials	University E-learning Platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms, laboratories
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Program leaders	Direct
Extent of achievement of course learning outcomes	Faculty	Indirect
Quality of learning resources	Faculty	Direct

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	

Course Title:	Applied Data Mining
Course Code:	DS4125
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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3. Course Learning Outcomes.....	3
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1. Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 10
4. Pre-requisites for this course (if any): Data Analysis 2
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

In this course, students will learn the foundational data mining concepts and techniques for various data mining tasks such as association analysis, cluster analysis and outlier analysis. Also, students will learn how to use data mining tools to perform data mining tasks on real-world datasets. In addition, students will learn the basics of using tools and technologies for analysing and mining big data, which is large scale, high-dimensional, heterogenous and complex.

2. Course Main Objective

The primary objective of this course is to equip students with the knowledge and skills required to perform data mining using state-of-the art techniques and technologies to solve the real-world problems and enable informed decision making considering ethical perspectives..

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Explain various computational and statistical techniques for data mining and their applications.	K1
1.2	Identify the role of basic math, statistics and technology in solving computing problems and knowledge discovery.	K2
2	Skills:	
2.1	Apply data mining tools and appropriate statistical and computational techniques to generate insights and support decision making.	S1, S4
3	Values:	
3.1	Suggest effective and innovative data mining solutions.	V1
3.2	Demonstrate professional and ethical considerations of data mining.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to data mining: Data mining process Data types: Dependency vs. non-dependency oriented data Major building blocks Scalability issues	4
2	Data preparation: Feature extraction Discretization Binarization Scaling and normalization Sampling Dimensionality reduction	4
3	Similarities and distances: Multidimensional data Text similarity measures Temporal similarity measures Graph similarity measures Supervised similarity functions	8
4	Association pattern mining	8
5	Cluster analysis	4
6	Outlier analysis	4
7	Mining text data	4
8	Data mining tools: RapidMiner	4
Total		40

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		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.1	Explain various computational and statistical techniques for data mining and their applications.	Lectures Discussions	HomeWorks and assignments Exams and quizzes Class discussions
1.2	Identify the role of basic math, statistics and technology in solving computing problems and knowledge discovery.	Lectures Discussions	Homework assignments Exams and quizzes Class discussions
2.0	Skills		
2.1	Apply data mining tools and appropriate statistical and computational techniques to generate insights and support decision making.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
3.0	Values		
3.1	Suggest effective and innovative data mining solutions.	Lectures Labs Discussions	Homework and assignments Class discussions
3.2	Demonstrate professional and ethical considerations of data mining.	Lectures Labs Discussions	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	20
2	Lab	5	25
3	Mid-term Exam	6	15
4	Final Exam	13	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:

Office hours between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Data Mining: The Textbook by Charu Aggarwal, Springer, 2015
Essential References Materials	North, M. 2018, Data Mining for the Masses, Third Edition: With Implementations in RapidMiner and R, CreateSpace Independent Publishing Platform.
Electronic Materials	University E-learning Platform

Other Learning Materials	
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2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom + lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Capstone Project I
Course Code:	DS4191
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
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<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1.Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 10
4. Pre-requisites for this course (if any): Completing 90 credit hours
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	30

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>The capstone project aims to give students full hands-on experience in developing data-driven solutions for a specific real-world problem by applying previously learned concepts and skills. Students are expected to select a specific problem, study it, perform analysis, determine the requirements and design a suitable solution. Students are expected to deliver a report at the end of the course.</p>
<p>2. Course Main Objective</p> <p>The objective of this course can be summarized as follows:</p> <ul style="list-style-type: none"> • Recognize a real client, feasible project topic related to data science discipline. • Design and adhere to the project development life cycle. • Identify development and implementation tools and tools. • Develop writing and interpretation skills related to the deliverables of the project. • Develop teamwork and leadership abilities to deliver the project according to a timeline.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Demonstrate understanding of the data project life cycle and design principles for data exploration, manipulation and management.	K1
1.2	Demonstrate understating of the role of science and technology in building data-oriented solutions for a wide range of fields and applications.	K2
1.3	Explain the difference between possible methodologies for developing a data-oriented project.	K3
2	Skills:	
2.1	Use different data science methods and tools to design creative applications and solutions in a specific field.	S1, S2
2.2	Conduct appropriate research to analyze and develop data-oriented solutions.	S3
2.3	Apply different interpretation methods to present data involved in the project.	S4
2.4	Apply appropriate techniques to store, manipulate and manage data in the project.	S4
3	Values:	
3.1	Suggest effective and innovative mechanisms to use the data in ways that could advance the society and/or an organization.	V1
3.2	Show ethical and professional commitment while working with peers and stakeholders.	V2, V3
3.3	Demonstrate the ability to learn new skills as required by the project.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Problem Definition	6
2	Collect system requirement from users and stakeholders	6
3	System analysis	9
4	Documentation	9
Total		30

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	Demonstrate understanding of the data project life cycle and design principles for data exploration, manipulation and management.	Lectures Labs Discussions	HomeWorks and assignments Exams and quizzes Class discussions
1.2	Demonstrate understating of the role of science and technology in building data-oriented solutions for a wide range of fields and applications.	Lectures Labs Discussions	HomeWorks and assignments Exams and quizzes Class discussions

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	Explain the difference between possible methodologies for developing a data-oriented project.	Lectures Labs Discussions	HomeWorks and assignments Exams and quizzes Class discussions
2.0	Skills		
2.1	Use different data science methods and tools to design creative applications and solutions in a specific field.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.2	Conduct appropriate research to analyze and develop data-oriented solutions.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.3	Apply different interpretation methods to present data involved in the project.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.4	Apply appropriate techniques to store, manipulate and manage data in the project.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
3.0	Values		
3.1	Suggest effective and innovative mechanisms to use the data in ways that could advance the society and/or an organization.	Lectures Labs Discussions	Homework and assignments Class discussions
3.2	Show ethical and professional commitment while working with peers and stakeholders.	Lectures Labs Discussions	Homework and assignments Class discussions
3.3	Demonstrate the ability to learn new skills as required by the project.	Lectures Labs Discussions	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Initial evaluation	3	20
3	Mid evaluation	6	20
4	Final evaluation	13	60

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	As recommended by the supervisor accordingly with the used development methods
Essential References Materials	
Electronic Materials	University E-learning Platform
Other Learning Materials	Saudi Digital Library: https://portal.sdl.edu.sa

2. Facilities Required

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

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Year 4 – Level 11

Course Title:	Ethical Considerations in Data Science
Course Code:	DS4201
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	4
2. Assessment Tasks for Students.....	4
<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources.....	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 2
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 11
4. Pre-requisites for this course (if any):
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	20	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	20

B. Course Objectives and Learning Outcomes

1. Course Description

This course explores the social and ethical consequences (such as bias, injustice, and discrimination) of the choices individuals make at the different stages of the data analysis process, from data collection and storage to understand feedback loops in analysis. It also discusses algorithmic challenges that arise when addressing real-world problems via the lens of data science.

Through class discussions, case studies and exercises, students will learn the basics of ethical thinking in science and how to implement data science solutions in an even-handed and ethical manner that minimizes the risk of undue harm to vulnerable members of society.

2. Course Main Objective

The main objective of this course is to study the distinct challenges associated with ethics and algorithmic techniques in modern data science and its applications (e.g., data mining and big data). In specific, this course should help students to identify ethical issues in the study design,

data collection, and data analysis process and learn about best practices for conducting and managing ethical data science projects.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Understand how to improve model transparency, even for black box models.	K1
1.2	Construct a case study that illustrates the role of data science in society.	K1
1.3		
2	Skills :	
2.1	Detail best practices for conducting ethical research for an enterprise.	S3
2.2	Diagnose bias and unfairness within models using multiple metrics.	S4
2.3	Audit projects to ensure fairness and minimize the possibility of unintended harm.	S4
2.4		
3	Values:	
3.1	Explain the ethical and/or legal constraints in the study design, data collection, data analysis, and data sharing.	V2
3.2		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Ethical Considerations in DS Ethical Problems in Data Science Today Ethical Concerns Around Data Collection, Storage, and Analysis	2
2	Modeling and the Black-Box Algorithm Assessing Model Performance The Ethical Challenge of Black Boxes Ethical Challenges with Interpretable Models Problems with Black-Box Predictive Models Problems with Unsupervised Algorithms	4
3	The Ways AI Goes Wrong AI and Intentional Consequences by Design AI and Unintended Consequences cross different fields (healthcare, finance, technology, etc..) AI in the Context of Existing Law and Policy	2
4	The Ethical Data Science Process: The Responsible Data Science Framework Fairness, Transparency, Accountability, and Privacy Bridging the Gap Between Principles and Practice with the Responsible Data Science	4
5	Ethical Data Science in Practice: Beginning a Responsible Data Science Project How the Responsible Data Science Framework Addresses the Common Cause Datasets Used Project Structure and Documentation Data Preparation	4

6	Ethical Data Science in Practice: Auditing a Responsible Data Science Project	4
	Fairness and Data Science in Practice and Fairness Metrics	
	Mitigating Bias to Improve Fairness	
	Preprocessing, in-processing, and postprocessing	
Total		20

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	Understand how to improve model transparency, even for black box models.	Lectures Assign open-ended questions Brainstorming	Homework assignments Exams and quizzes Problem class discussions
1.2	Construct a case study that illustrates the role of data science in society.	Lectures Assign open-ended questions Brainstorming	Homework assignments Exams and quizzes Problem class discussions
...			
2.0	Skills		
2.1	Detail best practices for conducting ethical research for an enterprise.	Lectures Assign open-ended questions Brainstorming Encourage critical thinking	Homework assignments Exams and quizzes Problem class discussions
2.2	Diagnose bias and unfairness within models using multiple metrics.	Lectures Assign open-ended questions Brainstorming Encourage critical thinking	Homework assignments Exams and quizzes Problem class discussions
2.3	Audit projects to ensure fairness and minimize the possibility of unintended harm.	Lectures Assign open-ended questions Brainstorming Encourage critical thinking	Homework assignments Exams and quizzes Problem class discussions
3.0	Values		
3.1	Explain the ethical and/or legal constraints in the study design, data collection, data analysis, and data sharing.	Lectures Assign open-ended questions Brainstorming Encourage critical thinking	Homework assignments Exams and quizzes Problem class discussions
3.2			
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	60%
2	Midterm Exam	6	15%
3	Assignments	2-11	25%
4			

*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 :

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Responsible Data Science, 2021, 1st Edition, By Grant Fleming and Peter C. Bruce. Wiley. ISBN: 978-1119741756
Essential References Materials	<p>Zimmer, M. (2010). "But the data is already public": On the ethics of research in Facebook. <i>Ethics and Information Technology</i>, 12(4), 313–325.</p> <p>Barocas, S., & Nissenbaum, H. (2014, November). Big data's end run around procedural privacy protections: Recognizing the inherent limitations of consent and anonymity. <i>Communications of the ACM</i>, 57(11), 31-33.</p> <p>Ohm, P. (2009). Broken promises of privacy: Responding to the surprising failure of anonymization. <i>UCLA Law Review</i>, 57, 1701. (pages 1701-1731)</p>
Electronic Materials	University E-learning Platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show Smart Board
Other Resources	

Item	Resources
(Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Capstone Project II
Course Code:	DS4292
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	4
2. Assessment Tasks for Students	4
<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 11
4. Pre-requisites for this course (if any): Capstone project I
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	30

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>Students are expected to continue on what has been achieved in the previous course Capstone project I. In general, the capstone project aims to give students full hands-on experience in developing data-driven solutions for a specific real-world problem by applying previously learned concepts and skills. Students are expected to select a specific problem, study it, perform analysis, determine the requirements and design a suitable solution. Students are expected to deliver a report at the end of the course.</p>
<p>2. Course Main Objective</p> <p>The objective of this course can be summarized as follows:</p> <ul style="list-style-type: none"> • Recognize a real client, feasible project topic related to data science discipline. • Design and adhere to the project development life cycle. • Identify development and implementation tools and tools.

- Develop writing and interpretation skills related to the deliverables of the project.
- Develop teamwork and leadership abilities to deliver the project according to a timeline.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Demonstrate understanding of the data project life cycle and design principles for data exploration, manipulation and management.	K1
1.2	Demonstrate understating of the role of science and technology in building data-oriented solutions for a wide range of fields and applications.	K2
1.3	Explain the difference between possible methodologies for developing a data-oriented project.	K3
2	Skills:	
2.1	Use different data science methods and tools to design creative applications and solutions in a specific field.	S1, S2
2.2	Conduct appropriate research to analyze and develop data-oriented solutions.	S3
2.3	Apply different interpretation methods to present data involved in the project.	S4
2.4	Apply appropriate techniques to store, manipulate and manage data in the project.	S4
3	Values:	
3.1	Suggest effective and innovative mechanisms to use the data in ways that could advance the society and/or an organization.	V1
3.2	Show ethical and professional commitment while working with peers and stakeholders.	V2, V3
3.3	Demonstrate the ability to learn new skills as required by the project.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Recap of system analysis	3
2	System design	9
3	Building the dataset	9
4	Documentation	9
Total		30

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	Demonstrate understanding of the data project life cycle and design principles for data exploration, manipulation and management.	Lectures Labs Discussions	HomeWorks and assignments Exams and quizzes Class discussions
1.2	Demonstrate understating of the role of science and technology in building	Lectures Labs	HomeWorks and assignments

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	data-oriented solutions for a wide range of fields and applications.	Discussions	Exams and quizzes Class discussions
1.3	Explain the difference between possible methodologies for developing a data-oriented project.	Lectures Labs Discussions	HomeWorks and assignments Exams and quizzes Class discussions
2.0	Skills		
2.1	Use different data science methods and tools to design creative applications and solutions in a specific field.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.2	Conduct appropriate research to analyze and develop data-oriented solutions.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.3	Apply different interpretation methods to present data involved in the project.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.4	Apply appropriate techniques to store, manipulate and manage data in the project.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
3.0	Values		
3.1	Suggest effective and innovative mechanisms to use the data in ways that could advance the society and/or an organization.	Lectures Labs Discussions	Homework and assignments Class discussions
3.2	Show ethical and professional commitment while working with peers and stakeholders.	Lectures Labs Discussions	Homework and assignments Class discussions
3.3	Demonstrate the ability to learn new skills as required by the project.	Lectures Labs Discussions	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Initial evaluation	3	20
3	Mid evaluation	6	20
4	Final evaluation	13	60

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	As recommended by the supervisor accordingly with the used development methods
Essential References Materials	
Electronic Materials	University E-learning Platform
Other Learning Materials	Saudi Digital Library: https://portal.sdl.edu.sa

2. Facilities Required

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

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Data Visualization
Course Code:	DS4226
Program:	Bachelor of Science in Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 11
4. Pre-requisites for this course (if any): Data Modeling 1
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces data literacy required as a key twenty-first century skill. Students learn the nature of data across different domains and the concepts and skills of data visualization by understanding, questioning, and problematizing how data are generated, analyzed, and used. Students will be able to apply its concepts and skills to visualize data, interpret the findings, and examine the impacts of data-driven decision. Students will also learn the basics of Tableau, the industry standard in data visualization tools, to make sense of and visualize publicly available data.

2. Course Main Objective

Understand and apply data visualization best practices to communicate accessible and meaningful insights.

Construct captivating and engaging visualizations, dashboards, and stories in Tableau. Develop meaningful data stories, gaining experience with the iterative process of data storytelling.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Understand the fundamental design principles and different types of data visualization.	K1
1.2	Identify chart types - tables, scatter plots, pie charts, histograms, graphs, data maps including pixel-, glyph-, graph- and map-based representations	K1
1...		
2	Skills :	
2.1	Practice the core principles using widely available tools	S2
2.2	Identify the various roles that visualization can play in Data Science	S3
2.3	Implement an effective visualization and dashboard, given a set of data that has to be used for a particular purpose	S1
2.4	Detect and understand the stories within datasets and extract insights from that data.	S1
3	Values:	
3.1	Appropriate appreciation of the role of visualization	V1
3.2	Effectively present data visually to enhance audience comprehension of findings and insights.	V3
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Overview of data visualization	3
2	Principles for data visualization	3
3	Data literacy	3
4	Common visualization idioms	8
5	Introduction to Tableau	5
6	Tableau: Multivariate visualization	5
7	Storytelling techniques in data analysis	8
8	Tableau: Dashboard and Story	5
Total		40

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	Understand the fundamental design principles and different types of data visualization.	Lectures, lab	Assignments, Exams, Project
1.2	Identify chart types - tables, scatter plots, pie charts, histograms, graphs, data maps including pixel-, glyph-, graph- and map-based representations	Lectures, lab, discussions	Assignments, Exams, Project

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	Skills		
2.1	Practice the core principles using widely available tools	Lectures, lab	Assignments, Exams, Project
2.2	Identify the various roles that visualization can play in Data Science	Lectures, lab, discussions	Assignments, Exams, Project
1.3	Implement an effective visualization and dashboard, given a set of data that has to be used for a particular purpose	Lectures, lab, discussions	Assignments, Exams
1.4	Detect and understand the stories within datasets and extract insights from that data.	Lectures, lab, discussions	Assignments, Exams, Project
3.0	Values		
3.1	Appropriate appreciation of the role of visualization	Lectures, lab, discussions	Assignments, Exams, Project
3.2	Effectively present data visually to enhance audience comprehension of findings and insights.	Lectures, lab, discussions	Assignments, Exams, Project
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	10
2	Lab	5	25
3	Mid-term Exam	6	10
4	Project	10	15
5	Final Exam	13	40
6			
7			
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 between 2-3 hours per week

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Creating Data Stories with Tableau Public, Packt Publishing, Ashley Ohmann, Matt Floyd Munzner, T. (2014). Visualization Analysis and Design (1st ed.). A K Peters/CRC Press. https://doi.org/10.1201/b17511
Essential References Materials	

Electronic Materials	Tableau Desktop license on their laptop (students are eligible for a free one-year license)
Other Learning Materials	

2. Facilities Required

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

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students Feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Big Data
Course Code:	DS4203
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours:
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 11
4. Pre-requisites for this course (if any): Advanced Database Systems
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	% 100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

This course provides a basic introduction to big data and corresponding quantitative research methods. The objective of the course is to familiarize students with big data analysis as a tool for addressing substantive research questions. The course begins with a basic introduction to big data and discusses what the analysis of this data entails, as well as associated technical, conceptual and ethical challenges. Strengths and limitations of big data research are discussed in depth using real-world examples. Students then engage in case study exercises in which small groups of students develop and present a big data concept for a specific real-world case. This includes practical exercises to familiarize students with the format of big data. It also provides a first hands-on experience in handling and analyzing large, complex data structures. The block course is designed as a primer for anyone interested in attaining a basic understanding of what big data analysis entails.

2. Course Main Objective

- Understand the Big Data Platform and its Use cases
- Provide an overview of Apache Hadoop

- Provide HDFS Concepts and Interfacing with HDFS
- Understand Map Reduce Jobs
- Provide hands on Hadoop Eco System
- Apply analytics on Structured, Unstructured Data.
- Exposure to Data Analytics with R.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Learn basic concepts of big data and machine learning	K1
1.2	Being able to develop a reasonably sophisticated big data application	K1
1.3	Understand the importance of big data and its various concepts like data preprocessing, various classification algorithms etc.	K1
2	Skills:	
2.1	Manage Job Execution in Hadoop Environment	S4
2.2	Analyze Infosphere Big Insights Big Data Recommendations.	S4
2.3	Apply Machine Learning Techniques using R	S4
2.4	Develop a reasonably sophisticated data mining application	S4
3	Values:	
3.1	Understand the social and industrial impact of big data issues	V1
3.2	Develop the methods and tools for the given task and working with groups	V3

C. Course Content

No	List of Topics	Contact Hours
1	Fundamentals of Big Data Analysis <ul style="list-style-type: none"> • Introduction – What is Big Data? • Handling and Processing Big Data • Methodological Challenges and Problems • Example of Applications 	4
2	Challenges with Big Data	4
3	Big Data Analysis in Practice	4
4	Introducing Hadoop	4
5	HDFS(Hadoop Distributed File System)	4
6	Hadoop Eco System	4
7	Data Analytics with R	4
8	Evolution of Big Data	4
9	The Big Data Technology Landscape and big data visitation	4
10	Big Data Scientific Workflow Management and Optimization	4
Total		40

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	Learn basic concepts of big data and machine learning	Lectures	Exam
1.2	Being able to develop a reasonably sophisticated big data application	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz Oral presentation
1.3	Understand the importance of big data and its various concepts like data preprocessing, various classification algorithms etc.	Lectures Laboratory Discission	Exam Lab work Quiz
2.0	Skills		
2.1	List the components of Hadoop and Hadoop Eco-System	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz Oral presentation
2.2	Access and Process Data on Distributed File System	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz Oral presentation
2.3	Manage Job Execution in Hadoop Environment	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz Oral presentation
2.4	Analyze Infosphere Big Insights Big Data Recommendations.	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz Oral presentation
2.5	Apply Machine Learning Techniques using R	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz Oral presentation
2.6	Develop a reasonably sophisticated big data application	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz Oral presentation
3.0	Values		
3.1	Understand the social and industrial impact of big data issues	Lectures Laboratory Discission	Exam Lab work Quiz

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Collaborative group project	Oral presentation
3.2	Develop the methods and tools for the given task and working with groups	Lectures Laboratory Discussion Collaborative group project	Exam Lab work Quiz Oral presentation

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Lab Assessment	12	%25
4	Assignment	2-11	%20
5	Midterm	6	%15
6	Final exam	13	%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 :

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Erl, T., Khattak, W. and Buhler, P., 2016. <i>Big data fundamentals: concepts, drivers & techniques</i> . Prentice Hall Press.
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms, laboratories
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Program leaders	Direct
Extent of achievement of course learning outcomes	Faculty	Indirect
Quality of learning resources	Faculty	Direct

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	

Course Title:	Business Analytics
Course Code:	DS4215
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information systems
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 11
4. Pre-requisites for this course (if any): Data Analysis 2
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	% 100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>Analytics has been defined as the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions. Analytics is more than just analytical methodologies or techniques used in logical analysis. It is a process of transforming data into actions through analysis and insights in the context of organizational decision making and problem solving. Analytics includes a range of activities, including business intelligence, which is comprised of standard and ad hoc reports, queries and alerts; and quantitative methods, including statistical analysis, forecasting/ extrapolation, predictive modeling (such as data mining), optimization and simulation.</p>
<p>2. Course Main Objective</p> <ol style="list-style-type: none"> To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making. To become familiar with the processes needed to develop, report, and

- analyze business data.
3. To learn how to use and apply Excel and Excel add-ins to solve business problems.
 4. Understand how to interpret probability and probabilistic modeling, in the evaluation of risk
 5. Learn how to understand and interpret the basic tools of risk analysis – fault trees, event trees, and simulation models
 6. Understand the issues surrounding the use of risk analysis in decision making

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Identify and describe complex business problems in terms of analytical models.	K1
1.2	Communicate technical information to both technical and non-technical audiences in speech, in writing, and graphically.	K3
2	Skills :	
2.1	Apply appropriate analytical methods to find solutions to business problems that achieve stated objectives	S1
2.2	Translate results of business analytic projects into effective courses of action.	S3
2.3	Develop analytical methods and use it to find solutions to business problems	S2
3	Values:	
3.1	Demonstrate ethical decision-making in structured or unstructured and ambiguous situations.	V1
3.2	Exhibit effective collaboration and leadership skills.	V3
3.3	Apply research skills into business analytics problems and the application of these in business decision-making.	V1

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Business Analytics	4
2	Linear Regression	4
3	Time Series Analysis	4
4	Data Mining – Cluster Analysis	4
5	Data Mining – Market Basket Analysis	4
6	Spreadsheet Models	4
7	Integer Linear Optimization	4
8	Linear Optimization	4
9	Nonlinear Optimization	4
10	Decision Analysis	4
Total		40

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	Identify and describe complex business problems in terms of analytical models.	Lectures Discission	Exam Lab work Quiz
1.2	Communicate technical information to both technical and non-technical audiences in speech, in writing, and graphically.	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz
2.0	Skills		
2.1	Apply appropriate analytical methods to find solutions to business problems that achieve stated objectives	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz
2.2	Translate results of business analytic projects into effective courses of action.	Lectures Laboratory Discission Collaborative group project	Exam Lab work Quiz
...			
3.0	Values		
3.1	Demonstrate ethical decision-making in structured or unstructured and ambiguous situations.	Lectures Laboratory Discission Collaborative group project	Exam Lab work
3.2	Exhibit effective collaboration and leadership skills.	Lectures Laboratory Discission Collaborative group project	Exam Lab work

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignment	2-11	%20
2	Midterm	6	%15
3	Final exam	13	%40
4	Lab Assessment	12	%25

*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 :

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Essentials of Business Analytics, 2014, 1st Edition, By Camm, Cochran, Fry, Ohlmann, Anderson, Sweeney and Williams, ISBN: 978-1-285-18727-3
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

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

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Program leaders	Direct
Extent of achievement of course learning outcomes	Faculty	Indirect
Quality of learning resources	Faculty	Direct

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	

Year 4 – Level 12

Course Title:	Data Policy and Governance
Course Code:	DS4301
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer Science and Information Systems
Institution:	Umm Al-Qura University

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<u>D. Teaching and Assessment</u>	4
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<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 2
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 12
4. Pre-requisites for this course (if any):
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	20	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	20

B. Course Objectives and Learning Outcomes

1. Course Description

As data and analytics strategies become integral to all aspects of digital business, individuals need privacy laws and policies to protect their data and information. Organizations also need data governance for the correct administration and management of data policy in the organization to protect the organizations assets and comply with government legislations.

This course introduces students to data privacy laws such as Intellectual Property and Privacy Act and explains different data policies used to protect Personally Identifiable Information (PII), for example. The course discusses data privacy implications of modern technologies such as big data and data mining techniques. It also covers the differences between US, EU, and SA data protection laws and legislations. Considering that much of data governance policy should be made up of the data protection policy, the course gives a high-level introduction to data governance and briefly explains data governance best practices.

2. Course Main Objective

The aim of this course is to provide students with knowledge in Privacy Laws and Data Protection and Data Governance. This allows students to help manage, plan, support, analyze, and deliver an ever-growing volume of data and information within their organizations.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Be able to discuss why privacy and data protection is important to society.	K1
1.2	Be familiar with fair information practice principles.	K1
1.3	Understand the differences between data privacy regulation in the US, EU, and SA.	K1
1.4	Understand how to apply data governance, privacy and data protection controls to help reduce risks, issues and threats through policy, strategies and systems	K1
2	Skills :	
2.1	Be able to read, understand, and evaluate privacy policies.	S4
2.2	Be able to communicate the data privacy implications of a technology with policy-makers, lawyers, and business stakeholders.	S3
2.3	Develop policy and communications to help address information governance, compliance and standards whilst addressing legal and audit requirements	S3
3	Values:	
3.1	Explain the ethical and/or legal constraints in the study design, data collection, data analysis, and data sharing.	V2
3.2		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Data Policy and Governance Why it is important?	2
2	Data as Intellectual Property Intellectual Property Rights Protecting Intellectual Property Fair Use (Case Studies) New Restriction of Use Protection of Software Open Protection Software	4
3	Data and Information Privacy Prospective on Privacy Information Disclosure Fair information Practice Principles of Privacy Protection Data Privacy and Personally Identifiable Information (PII) Data Mining and Privacy (Algorithmic Privacy)	4
4	Data Privacy Laws and Governments US Legislation Restricting Information Collection US Data Privacy Laws (Privacy Act, Personal Data Privacy) European Union Data Privacy and Protection	4

	Saudi Arabia Privacy and Data Protection Regulation of Public and Private Databases	
5	Evaluate Data Privacy Policies (Case studies and Examples)	2
6	Enterprise Data Governance Introduction to Data Governance and Principles Understanding Regulations, Compliance Issues, Legal, Audit and Threats Policies, Procedures and Undertaking a Data Maturity Assessment Knowledge, Content, Document and Records Management Establishing Data Governance, Roles, and Responsibilities Best Practices and Case Studies	4
Total		20

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	Be able to discuss why privacy and data protection is important to society.	Lectures Assign open-ended questions Brainstorming Encourage Critical Thinking	Homework assignments Exams and quizzes Problem class discussions
1.2	Be familiar with fair information practice principles.	Lectures Assign open-ended questions Brainstorming	Homework assignments Exams and quizzes Problem class discussions
1.3	Understand the differences between data privacy regulation in the US, EU, and SA.	Lectures Assign open-ended questions Brainstorming Encourage Critical Thinking	Homework assignments Exams and quizzes Problem class discussions
1.4	Understand how to apply data governance, privacy and data protection controls to help reduce risks, issues and threats through policy, strategies and systems	Lectures Assign open-ended questions Brainstorming Encourage Critical Thinking	Homework assignments Exams and quizzes Problem class discussions
2.0	Understand how to apply data governance, privacy and data protection controls to help reduce risks, issues and threats through policy, strategies and systems		
2.1	Be able to read, understand, and evaluate privacy policies.	Lectures Assign open-ended questions Brainstorming Encourage critical thinking	Homework assignments Exams and quizzes Problem class discussions
2.2	Be able to communicate the data privacy implications of a technology	Lectures Assign open-ended questions	Homework assignments Exams and quizzes

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	with policy-makers, lawyers, and business stakeholders.	Brainstorming Encourage critical thinking	Problem class discussions
2.3	Develop policy and communications to help address information governance, compliance and standards whilst addressing legal and audit requirements	Lectures Assign open-ended questions Brainstorming Encourage critical thinking	Homework assignments Exams and quizzes Problem class discussions
3.0	Values		
3.1	Explain the ethical and/or legal constraints in the study design, data collection, data analysis, and data sharing.	Lectures Assign open-ended questions Brainstorming Encourage critical thinking	Homework assignments Exams and quizzes Problem class discussions
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	60%
2	Midterm Exam	6	15%
3	Assignments	2-11	25%
4			

*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 :

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Ethics for the Information Age, 2016, 7th Edition, By Michael Quinn. ISBN: 9780134296548.
Essential References Materials	<p>The EU General Data Protection Regulation (GDPR) – Official Legal Text (gdpr-info.eu)</p> <p>Complete Guide to Privacy Laws in the US Varonis</p> <p>Privacy and Data Protection in the Kingdom of Saudi Arabia (my.gov.sa)</p> <p>Overview of The Privacy Act of 1974 (2020 Edition) (justice.gov)</p>

Electronic Materials	University E-learning Platform
Other Learning Materials	Information Privacy Law, 2017, 6th Edition, By Daniel J. Solove, Paul M. Schwartz. ISBN: 1454892757.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Capstone Project III
Course Code:	DS4393
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	4
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<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources.....	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 12
4. Pre-requisites for this course (if any): Capstone project II
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

The capstone project III is the third course in the series of courses dedicated for building the graduation project. In general, the capstone project aims to give students full hands-on experience in developing data-driven solutions for a specific real-world problem by applying previously learned concepts and skills. Students are expected to select a specific problem, study it, perform analysis, determine the requirements and design a suitable solution. Students are expected to deliver a report at the end of the course.

2. Course Main Objective

The objective of this course can be summarized as follows:

- Recognize a real client, feasible project topic related to data science discipline.
- Design and adhere to the project development life cycle.
- Identify development and implementation tools and tools.
- Develop writing and interpretation skills related to the deliverables of the project.
- Develop teamwork and leadership abilities to deliver the project according to a timeline.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Demonstrate understanding of the data project life cycle and design principles for data exploration, manipulation and management.	K1
1.2	Demonstrate understating of the role of science and technology in building data-oriented solutions for a wide range of fields and applications.	K2
1.3	Explain the difference between possible methodologies for developing a data-oriented project.	K3
2	Skills:	
2.1	Use different data science methods and tools to design creative applications and solutions in a specific field.	S1, S2
2.2	Conduct appropriate research to analyze and develop data-oriented solutions.	S3
2.3	Apply different interpretation methods to present data involved in the project.	S4
2.4	Apply appropriate techniques to store, manipulate and manage data in the project.	S4
3	Values:	
3.1	Suggest effective and innovative mechanisms to use the data in ways that could advance the society and/or an organization.	V1
3.2	Show ethical and professional commitment while working with peers and stakeholders.	V2, V3
3.3	Demonstrate the ability to learn new skills as required by the project.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Implementation	12
2	Testing	6
3	Documentation	12
Total		30

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	Demonstrate understanding of the data project life cycle and design principles for data exploration, manipulation and management.	Lectures Labs Discussions	HomeWorks and assignments Exams and quizzes Class discussions
1.2	Demonstrate understating of the role of science and technology in building data-oriented solutions for a wide range of fields and applications.	Lectures Labs Discussions	HomeWorks and assignments Exams and quizzes Class discussions

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	Explain the difference between possible methodologies for developing a data-oriented project.	Lectures Labs Discussions	HomeWorks and assignments Exams and quizzes Class discussions
2.0	Skills		
2.1	Use different data science methods and tools to design creative applications and solutions in a specific field.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.2	Conduct appropriate research to analyze and develop data-oriented solutions.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.3	Apply different interpretation methods to present data involved in the project.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
2.4	Apply appropriate techniques to store, manipulate and manage data in the project.	Lectures Labs Discussions	Homework assignments Exams and quizzes Class discussions
3.0	Values		
3.1	Suggest effective and innovative mechanisms to use the data in ways that could advance the society and/or an organization.	Lectures Labs Discussions	Homework and assignments Class discussions
3.2	Show ethical and professional commitment while working with peers and stakeholders.	Lectures Labs Discussions	Homework and assignments Class discussions
3.3	Demonstrate the ability to learn new skills as required by the project.	Lectures Labs Discussions	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Initial evaluation	3	20
3	Mid evaluation	6	20
4	Final evaluation	13	60

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	As recommended by the supervisor accordingly with the used development methods
Essential References Materials	
Electronic Materials	University E-learning Platform
Other Learning Materials	Saudi Digital Library: https://portal.sdl.edu.sa

2. Facilities Required

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

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Social Media Analytics
Course Code:	DS4325
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer Science and Information Systems
Institution:	Umm Al-Qura University

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3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	4
2. Assessment Tasks for Students	4
<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th year/ 12 level
4. Pre-requisites for this course (if any): Data Analysis 2
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course integrates social media, network analysis, and data mining to provide a convenient and coherent platform for students to understand the basics and potentials of social media analytics. It introduces basic concepts in social media analytics, key metrics to characterize networks, models to explain the generation of networks, and methods to analyze networks. The students learn to use software tools to retrieve, explore, visualize, and analyze real-world social network data. Then, how to generate insights that speak directly to the strategic and tactical goals of their business digital initiatives.

2. Course Main Objective

The aim of this course is to demonstrate to students both theoretical rationale and practical knowledge of important applications of network analysis methods. Students will be required to use APIs of social media websites such as Twitter, Facebook, Instagram to implement the assignment/project.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Understand the fundamental mathematical and computing principles of social media analytics.	K2
1.2	An ability to apply knowledge of computing to write social media analytics code.	K2
1.3	An ability to apply the appropriate analysis methods to deal with social media data.	K3
2	Skills :	
2.1	Apply conceptual understanding of social media analytics principles and theories.	S1
2.2	Implement and evaluate social media analytics process, component, or program.	S3
2.3	Investigate the real-world problems in the context of social media analytics and design to design innovative solutions.	S2
2.4	An ability to choose the appropriate methods to analyze data and extract desired knowledge (e.g., business forecast) from social media networks.	S1, S4
3	Values:	
3.1	Demonstrate own learning and professional development.	V3
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities.	V3
3.3	Act professionally, ethically, and responsibly with high moral standards when dealing with data	V2
3.4	Apply research skills into social media analytics problems and its application to benefit society and improve business decision-making.	V1

C. Course Content

No	List of Topics	Contact Hours
1	Introduction and network analysis methods	4
2	Actions analytics on social platform	8
3	Text analysis on social media	4
4	Social media apps analytics	4
5	Social media hypertext and location analytics	8
6	Social media search engine analytics	4
7	Aligning social media analytics with business goals	8
Total		40

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	Understand the fundamental mathematical and computing principles of social media analytics.	Lectures Assign open-ended questions	Practical assignments Exams and quizzes Practical projects

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Use cooperative learning	
1.2	An ability to apply knowledge of computing to write social media analytics code.	Lectures Assign open-ended questions Use cooperative learning	Practical assignments Exams and quizzes Practical projects
1.3	An ability to extract desired knowledge (e.g., business forecast) from social media networks.	Lectures Assign open-ended questions Use cooperative learning	Practical assignments Exams and quizzes Practical projects
2.0	Skills		
2.1	Apply conceptual understanding of social media analytics principles and theories.	Lectures Assign open-ended questions Use cooperative learning	Practical assignments Exams and quizzes Practical projects
2.2	Implement and evaluate social media analytics process, component, or program.	Lectures Use cooperative learning	Practical assignments Practical projects
2.3	Investigate the real-world problems in the context of social media analytics and design to design innovative solutions.	Use cooperative learning	Practical project
3.0	Values		
3.1	Demonstrate own learning and professional development.	Lectures Use cooperative learning	Practical assignments Practical project
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities.	Brainstorming Use cooperative learning	Problem class discussions Practical project
3.3	Act ethically and responsibly with high moral standards.	Use cooperative learning	Practical project

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	40%
2	Lab Assessment	12	25%
3	Midterm Exam	6	15%
4	Assignments	2-11	20%
5			

*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 for students consoling and support (2 hours/week)

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<p>Creating Value With Social Media Analytics: Managing, Aligning, and Mining Social Media Text, Networks, Actions, Location, Apps, Hyperlinks, Multimedia, & Search Engines Data, 2018, 1st Edition, By Gohar F. Khan. ISBN: 1977543979.</p> <p>Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Instagram, GitHub, and More, 2019, 3rd Edition, By Matthew A. Russell, Mikhail Klassen. ISBN: 1491985046.</p>
Essential References Materials	Learning Social Media Analytics with R, 2017, 1 st Edition, By Raghav Bali, Dipanjan Sarkar, Tushar Sharma. ISBN: 1787127524.
Electronic Materials	University E-learning platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom Lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	
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Reference No.	
Date	

Course Title:	Cloud Data Management
Course Code:	DS4304
Program:	Bachelor of Science in Data Science
Department:	Information Science
College:	Computers and Information Systems
Institution:	Umm Al-Qura University

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F. Learning Resources and Facilities	26
1. Learning Resources	26
2. Facilities Required.....	27
G. Course Quality Evaluation	27
H. Specification Approval Data	27

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 12
4. Pre-requisites for this course (if any): Big Data
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

The course presents a top-down view of cloud computing, from applications and administration to programming and infrastructure. Its main focus is on parallel programming techniques for cloud computing and large scale distributed systems which form the cloud infrastructure.

This course will look at the principles behind data management in the cloud as well as discuss actual cloud data management systems that are currently in use or being developed. The topics covered in the course range from novel data processing paradigms such as, MapReduce, to commercial cloud data management platforms such as, Google BigTable/Microsoft Azure, and open-source NoSQL databases such as, Cassandra/MongoDB.

2. Course Main Objective

This course gives students an insight into the basics of cloud data management and gain broad knowledge about the current state of the art in cloud data management and, through a course project, practical experience with a specific system.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	The ability to explain the fundamental concepts of Cloud Computing.	K1
1.2	The ability to explain the technology incorporated in Cloud Computing	K2
1.3		
1...		
2	Skills :	
2.1	The ability to explain key techniques for building cloud computing applications	S1
2.2	Utilize cloud services, applications, and providers to solve problems and challenges	S2
2.3		
2...		
3	Values:	
3.1	Solve a real-world problem using cloud computing through group collaboration.	V1, V3
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Cloud computing overview and basic concepts in cloud computing	3
2	Cloud architecture - layers and models	5
3	Cloud Computing Mechanisms	8
4	Distributed storage systems	5
5	Data Center Facilities	8
6	Adopting, Integrating, and Managing Cloud Services	5
7	Cloud Data Security	6
Total		40

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	The ability to explain the fundamental concepts of Cloud Computing.	Lectures, discussions	Assignments, Exams
1.2	The ability to identify applications of Cloud Computing	Lectures, lab, discussions	Assignments, Exams
...			
2.0	Skills		
2.1	The ability to explain key techniques for building cloud computing applications	Lectures, lab, discussions	Assignments, Exams
2.2	Utilize cloud services, applications, and providers to solve problems and challenges	Lectures, lab, discussions	Assignments, Exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
...			
3.0	Values		
3.1	Solve a real-world problem using cloud computing through group collaboration	Lectures, lab, discussions	Project
3.2			
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2-11	10
2	Lab	5	25
3	Mid-term Exam	6	10
4	Project	10	15
5	Final Exam	13	40
6			
7			
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 between 2-3 hours per week

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010 Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms, laboratories

Item	Resources
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show, software
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Cloud service provider

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students Feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Electives

Course Title:	Big Data Optimization
Course Code:	DS3059
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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<u>C. Course Content</u>	4
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<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources.....	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 4 th year
4. Pre-requisites for this course (if any): Big data
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>The course covers modern optimization algorithms and theory developed in recent years, suitable for big data applications. New methods and tools are needed to analyze vast datasets and optimization algorithms are at the heart of such efforts.</p>
<p>2. Course Main Objective</p> <p>The objective of this course is to equip students with various techniques that can be applied for big data optimization. In particular, the course aims can be summarized as follows:</p> <ul style="list-style-type: none"> • Understand the need for big data optimization. • Understand applications of big data optimization.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Identify fundamental big data optimization techniques.	K1

CLOs		Aligned PLOs
1.2	Explain the role of math and technology for big data optimization to solve real-world problems in a range of fields.	K2
2	Skills:	
2.1	Apply appropriate statistical methods and computational techniques to optimize big data.	S1
2.2	Develop reasonable research methods in big data optimization for different fields.	S3
3	Values:	
3.1	Apply big data optimization to generate innovative solutions that benefit society and improve decision-making.	V1
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with big data.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Optimization and its importance to Big Data processing	4
2	Optimization models and structure of big data: <ul style="list-style-type: none"> • Regularized, stochastic and linear conic optimization • Convexity and duality • The role of dimension, data quality, data size, solution accuracy, separability, sparsity and randomization in the design of algorithms 	12
3	Algorithms for big data problems, including: <ul style="list-style-type: none"> • Stochastic coordinate descent (parallel, distributed, accelerated) • Semi-stochastic gradient descent • Nesterov's sub-gradient descent 	12
4	Applications in data science, including: <ul style="list-style-type: none"> • Machine learning (e.g. support vector machine classification) • Internet (e.g. ranking) • Least squares and logistic regression (e.g. object recognition) 	12
Total		40

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	Identify fundamental big data optimization techniques.	Lectures Discussions	Exams and quizzes Problem class discussions
1.2	Explain the role of math and technology for big data optimization to solve real-world problems in a range of fields.	Lectures Discussions	Exams and quizzes Problem class discussions
2.0	Skills		
2.1	Apply appropriate statistical methods and computational techniques to optimize big data.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
			Practical projects
2.2	Develop reasonable research methods in big data optimization for different fields.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
3.0	Values		
3.1	Apply big data optimization to generate innovative solutions that benefit society and improve decision-making.	Lectures Discussions Labs	Homework and assignments Class discussions
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with big data.	Lectures Discussions Labs	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	40%
2	Lab Assessment	12	25%
3	Midterm Exam	6	15%
4	Assignments	2-11	20%

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Optimization for Data Analysis By Stephen Wright and Benjamin Recht. Cambridge University Press, 2022
Essential References Materials	First-order and Stochastic Optimization Methods for Machine Learning. Guanghui Lan. Springer, 2020 Algorithms for Optimization. Mykel J. Kochenderfer and Tim A. Wheeler. The MIT Press, 2019
Electronic Materials	University E-learning platform
Other Learning Materials	Big Data Optimization: Recent Developments and Challenges By Ali Emrouznejad. Springer, 2016. ISBN: 978-3-319-30265-2

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom Lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Data Science for Finance
Course Code:	DS3056
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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<u>A. Course Identification</u>	23
6. Mode of Instruction (mark all that apply)	3
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1. Course Description.....	3
2. Course Main Objective.....	3
3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	4
2. Assessment Tasks for Students	4
<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 3 rd or 4 th year
4. Pre-requisites for this course (if any): Data Analysis 1
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>Upon completion of this course, students will be able to apply fundamental algorithms and techniques for analyzing and processing financial data. Topics covered in this course include: sentiment analysis, advanced time series analysis, risk management, real-time pricing and economic data analysis, customer segmentation analysis, and machine learning algorithm creation for financial technologies.</p>
<p>2. Course Main Objective</p> <p>The objective of this course is to equip students with various data science techniques that can be applied in the finance field. In particular, the course aims can be summarized as follows:</p> <ul style="list-style-type: none"> • Understand the advantages of data science and specific analytical methods for finance professionals. • Understand effective data analysis and visualization techniques for financial data.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Identify fundamental financial analysis techniques and tools.	K1
1.2	Explain the role of math and technology for financial analysis to solve real-world problems for a range of applications.	K2
2	Skills:	
2.1	Apply appropriate statistical methods and computational techniques to analyze and visualize financial data to support problem solving.	S1, S4
2.2	Develop reasonable research methods in financial analysis.	S3
3	Values:	
3.1	Apply research skills into data science for finance to generate innovative solutions that benefit society and improve decision-making.	V1
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with finance data.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Data Science for Finance	4
2	Hands-on using Python for Financial Analysis	4
3	Financial Time Series Analysis In Python	8
4	Linear Regression for Finance	4
5	Data Science Problem Solving Process	4
6	Visualization of Financial Analysis Results	4
7	Clustering of Financial Data	8
8	Applications of Data Science to Finance and Economics Data	4
Total		40

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	Identify fundamental financial analysis techniques and tools.	Lectures Discussions	Exams and quizzes Problem class discussions
1.2	Explain the role of math and technology for financial analysis to solve real-world problems for a range of applications.	Lectures Discussions	Exams and quizzes Problem class discussions
2.0	Skills		
2.1	Apply appropriate statistical methods and computational techniques to analyze and visualize financial data to support problem solving.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
2.2	Develop reasonable research methods in financial analysis.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
			Practical projects
3.0	Values		
3.1	Apply research skills into data science for finance to generate innovative solutions that benefit society and improve decision-making.	Lectures Discussions Labs	Homework and assignments Class discussions
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with finance data.	Lectures Discussions Labs	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	40%
2	Lab Assessment	12	25%
3	Midterm Exam	6	15%
4	Assignments	2-11	20%
6			

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Big Data Science in Finance By Irene Aldridge, Marco Avellaneda, 2021, Wiley. ISBN: 978-1-119-60297-2
Essential References Materials	Machine Learning and Data Science Blueprints for Finance: From Building Trading Strategies to Robo-Advisors Using Python 1st Edition By Hariom Tatsat, Sahil Puri, Brad Lookabaugh, O'Reilly, ISBN-13: 978-1492073055, ISBN-10: 1492073059
Electronic Materials	University E-learning platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom Lab

Item	Resources
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Data Science for Hajj and Umrah
Course Code:	DS3053
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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<u>A. Course Identification</u>	23
6. Mode of Instruction (mark all that apply)	3
<u>B. Course Objectives and Learning Outcomes</u>	3
1. Course Description.....	3
2. Course Main Objective.....	3
3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	4
2. Assessment Tasks for Students.....	4
<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources.....	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 3 rd or 4 th year
4. Pre-requisites for this course (if any): Data Analysis II
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

Upon completion of this course, students will be able to apply fundamental algorithms and techniques for analyzing and processing Hajj and Umrah data. Topics covered in this course include: challenges and opportunities of Hajj and Umrah analytics, classification and prediction algorithms for Hajj and Umrah, Crowd Management support using Hajj and Umrah data analytics, and visualizing Hajj and Umrah data.

2. Course Main Objective

The objective of this course is to equip students with various data science techniques that can be applied in the healthcare field. In particular, the course aims can be summarized as follows:

- Explain and critically discuss key concepts, principles and methods of data science for Hajj and Umrah sector.
- Analyze, visualize and interpret Hajj and Umrah data.
- Critically examine the ethical, societal and regulatory principles and implications of data science for Hajj and Umrah.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Identify fundamental Hajj and Umrah data analysis techniques and tools.	K1
1.2	Explain the role of math and technology for Hajj and Umrah data analysis to solve real-world problems for a range of applications.	K2
2	Skills:	
2.1	Apply appropriate statistical methods and computational techniques to analyze and visualize Hajj and Umrah data to support problem solving.	S1, S4
2.2	Develop reasonable research methods in Hajj and Umrah analytics.	S3
3	Values:	
3.1	Apply research skills into data science for Hajj and Umrah to generate innovative solutions that benefit society and improve decision-making.	V1
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with Hajj and Umrah data.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Data Science in Hajj and Umrah: Benefits, Challenges and Opportunities	4
2	Classification Algorithms Using Hajj and Umrah Examples	8
3	Predictive analytics for Hajj and Umrah	4
4	The Role of Data Science in Improving Crowd Management	8
5	Big data in Hajj and Umrah sector	4
6	Visualization for Hajj and Umrah data	4
7	Ethical and security considerations for dealing with Hajj and Umrah data	4
8	Project Presentations	4
Total		40

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	Identify fundamental Hajj and Umrah data analysis techniques and tools.	Lectures Discussions	Exams and quizzes Problem class discussions

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	Explain the role of math and technology for Hajj and Umrah data analysis to solve real-world problems for a range of applications.	Lectures Discussions	Exams and quizzes Problem class discussions
2.0	Skills		
2.1	Apply appropriate statistical methods and computational techniques to analyze and visualize Hajj and Umrah data to support problem solving.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
2.2	Develop reasonable research methods in Hajj and Umrah analytics.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
3.0	Values		
3.1	Apply research skills into data science for Hajj and Umrah to generate innovative solutions that benefit society and improve decision-making.	Lectures Discussions Labs	Homework and assignments Class discussions
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with Hajj and Umrah data.	Lectures Discussions Labs	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	40%
2	Lab Assessment	12	25%
3	Midterm Exam	6	15%
4	Assignments	2-11	20%
6			

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Introduction to Data Science: Data Analysis and Prediction Algorithms with R, By Rafael A. Irizarry, 2019, CRC Press, ISBN 9781000708035
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Essential References Materials	
Electronic Materials	University E-learning platform
Other Learning Materials	Selected papers by course instructor

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom Lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Data Science for Healthcare
Course Code:	DS3054
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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<u>A. Course Identification</u>	23
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1. Course Description.....	3
2. Course Main Objective.....	3
3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	4
2. Assessment Tasks for Students.....	4
<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources.....	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 3 rd or 4 th year
4. Pre-requisites for this course (if any): Data Analysis II
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

Upon completion of this course, students will be able to apply fundamental algorithms and techniques for analyzing and processing healthcare data. Topics covered in this course include: health care data types, challenges and opportunities of healthcare analytics, classification algorithms for healthcare data, using deep learning for healthcare data, visualization and story-telling with healthcare data.

2. Course Main Objective

The objective of this course is to equip students with various data science techniques that can be applied in the healthcare field. In particular, the course aims can be summarized as follows:

- Explain and critically discuss key concepts, principles and methods of data science in health.
- Apply a range of specialized data science techniques to different medical and healthcare scenarios.
- Analyze health data, including summarization, visualization and interpretation.
- Critically examine the ethical, societal and regulatory principles and implications of data science in health.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Identify fundamental healthcare analysis techniques and tools.	K1
1.2	Explain the role of math and technology for healthcare analysis to solve real-world problems for a range of applications.	K2
2	Skills:	
2.1	Apply appropriate statistical methods and computational techniques to analyze and visualize healthcare data to support problem solving.	S1, S4
2.2	Develop reasonable research methods in healthcare analysis.	S3
3	Values:	
3.1	Apply research skills into data science for healthcare to generate innovative solutions that benefit society and improve decision-making.	V1
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with healthcare data.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Data Science in Healthcare: Benefits, Challenges and Opportunities	4
2	Classification Algorithms Using Medical Examples	8
3	The Role of Deep Learning in Improving Healthcare	8
4	Making Effective Use of Healthcare Data Using Data-to-Text Technology	4
5	Clinical Natural Language Processing with Deep Learning	4
6	Data visualization in healthcare	4
7	Story telling with healthcare data	4
8	Project Presentations	4
Total		40

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	Identify fundamental healthcare analysis techniques and tools.	Lectures Discussions	Exams and quizzes

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
			Problem class discussions
1.2	Explain the role of math and technology for healthcare analysis to solve real-world problems for a range of applications.	Lectures Discussions	Exams and quizzes Problem class discussions
2.0	Skills		
2.1	Apply appropriate statistical methods and computational techniques to analyze and visualize healthcare data to support problem solving.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
2.2	Develop reasonable research methods in healthcare analysis.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
3.0	Values		
3.1	Apply research skills into data science for healthcare to generate innovative solutions that benefit society and improve decision-making.	Lectures Discussions Labs	Homework and assignments Class discussions
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with healthcare data.	Lectures Discussions Labs	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	40%
2	Lab Assessment	12	25%
3	Midterm Exam	6	15%
4	Assignments	2-11	20%
6			

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Data Science for Healthcare: Methodologies and Applications, By Sergio Consoli, Diego Reforgiato Recupero, Milan Petković, 2019, Springer, ISBN: 978-3-030-05249-2
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Essential References Materials	Ott, R Lyman, and Michael T Longnecker. An Introduction to Statistical Methods & Data Analysis, 7th Edition. Cengage. ISBN 978-1305269477.
Electronic Materials	University E-learning platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom Lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Data Science for Sports
Course Code:	DS3055
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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<u>A. Course Identification</u>	23
6. Mode of Instruction (mark all that apply)	3
<u>B. Course Objectives and Learning Outcomes</u>	3
1. Course Description.....	3
2. Course Main Objective.....	3
3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	4
2. Assessment Tasks for Students	4
<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1.Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 3 rd or 4 th year
4. Pre-requisites for this course (if any): Data Analysis II
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>Upon completion of this course, students will be able to apply fundamental algorithms and techniques for analyzing and processing sports data. Topics covered in this course include: types of sports data, management of sports data, sports analytics and decision making using sports analytics.</p>
<p>2. Course Main Objective</p> <p>The objective of this course is to equip students with various data science techniques that can be applied in professional sports. In particular, the course aims can be summarized as follows:</p> <ul style="list-style-type: none"> • Explain and critically discuss key concepts, principles and methods of sports analytics. • Apply a range of specialized data science techniques to different sports data. • Analyze, interpret and visualize sports data. • Critically examine how sports data can be managed ethically and professionally.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Identify fundamental sports analytics techniques and tools.	K1
1.2	Explain the role of math and technology for sports analytics to solve real-world problems for a range of applications.	K2
2	Skills:	
2.1	Apply appropriate statistical methods and computational techniques to analyze and visualize sports data to support problem solving.	S1, S4
2.2	Develop reasonable research methods in sports analytics.	S3
3	Values:	
3.1	Apply research skills into data science for sports to generate innovative solutions that benefit society and improve decision-making.	V1
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with sports data.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Sports Analytics Sport Analytics as a Tool for Effective Decision-Making	4
2	Collection and Wrangling of Sports Data Exploration of Sports Datasets	4
3	Predictions of Match Results Probability Analysis of Sports Contests	8
4	Performance Analysis	8
5	Video-based Analysis: Applied Motion Analysis	4
6	Analysis of Coaching Behavior	4
7	Fan Analysis	4
8	Reliability and Ethical Issues in Sports Analysis	4
Total		40

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	Identify fundamental sports analytics techniques and tools.	Lectures Discussions	Exams and quizzes Problem class discussions
1.2	Explain the role of math and technology for sports analytics to solve real-world problems for a range of applications.	Lectures Discussions	Exams and quizzes Problem class discussions
2.0	Skills		
2.1	Apply appropriate statistical methods and computational techniques to analyze and visualize sports data to support problem solving.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	Develop reasonable research methods in sports analytics.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
3.0	Values		
3.1	Apply research skills into data science for sports to generate innovative solutions that benefit society and improve decision-making.	Lectures Discussions Labs	Homework and assignments Class discussions
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with sports data.	Lectures Discussions Labs	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	40%
2	Lab Assessment	12	25%
3	Midterm Exam	6	15%
4	Assignments	2-11	20%
6			

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Essentials of Performance Analysis in Sport. 3 rd edition, By Mike Hughes, Ian M. Franks, Henriette Dancs, 2019, ISBN 9780429340130
Essential References Materials	Research Methods for Sports Performance Analysis. By Peter O'Donoghue. 2009 Data Analytics in Football: Positional Data Collection, Modelling and Analysis. By Daniel Memmert, Dominik Raabe. 2018. Routledge Match Analysis: How to Use Data in Professional Sport. By Daniel Memmert. 2021
Electronic Materials	University E-learning platform
Other Learning Materials	Ott, R Lyman, and Michael T Longnecker. An Introduction to Statistical Methods & Data Analysis, 7th Edition. Cengage. ISBN 978-1305269477.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom Lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Information Retrieval
Course Code:	DS3058
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 3 rd or 4 th year
4. Pre-requisites for this course (if any): Data Analysis I
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

Information retrieval is the process through which a computer system can respond to a user's query for text-based information on a specific topic. IR was one of the first and remains one of the most important problems in the domain of natural language processing (NLP). Web search is the application of information retrieval techniques to the largest corpus of text anywhere in the web. This course introduces students to the main concepts and skills required for information retrieval.

2. Course Main Objective

The objective of this course is to equip students with various information retrieval techniques such as:

- Efficient text indexing
- Boolean and vector-space retrieval models
- Evaluation and interface issues
- IR techniques for the web, including crawling, link-based algorithms, and metadata usage
- Document clustering and classification
- Traditional and machine learning-based ranking approaches

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Identify fundamental Information retrieval techniques and tools.	K1
1.2	Explain the role of math and technology in the IR field to solve real-world problems in a range of fields.	K2
2	Skills:	
2.1	Apply appropriate statistical methods and computational techniques to retrieve data to support problem solving and decision making.	S1, S4
2.2	Develop reasonable research methods in IR.	S3
3	Values:	
3.1	Apply research skills into information retrieval to generate innovative solutions that benefit society and improve decision-making.	V1, V1
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with information.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to the course	4
2	Inverted Indices: Dictionary and postings lists, Boolean querying	4
3	Index Construction	4
4	Spelling correction	4
5	Scoring, term weighting and the vector space model	4
6	Probabilistic IR: the binary independence model, BM25, BM25F	4
7	Classification and clustering in vector spaces (Naive Bayes, kNN, decision boundaries)	4
8	Text classification	4
9	Distributed word representations for IR	4
10	Distributed word representations for IR	4
Total		40

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	Identify fundamental Information retrieval techniques and tools.	Lectures Discussions	Exams and quizzes Problem class discussions
1.2	Explain the role of math and technology in the IR field to solve real-world problems in a range of fields.	Lectures Discussions	Exams and quizzes Problem class discussions
2.0	Skills		
2.1	Apply appropriate statistical methods and computational techniques to retrieve data to support problem solving and decision making.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
2.2	Develop reasonable research methods in IR.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
3.0	Values		
3.1	Apply research skills into information retrieval to generate innovative solutions that benefit society and improve decision-making.	Lectures Discussions Labs	Homework and assignments Class discussions
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with information.	Lectures Discussions Labs	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	40%
2	Lab Assessment	12	25%
3	Midterm Exam	6	15%
4	Assignments	2-11	20%
6			

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Introduction to Information Retrieval, by C. Manning, P. Raghavan, and H. Schütze (Cambridge University Press, 2008).
Essential References Materials	
Electronic Materials	University E-learning platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom Lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Natural Language Processing
Course Code:	DS3051
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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1. Course Description.....	3
2. Course Main Objective.....	3
3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	4
2. Assessment Tasks for Students	4
<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1.Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 3 rd or 4 th year
4. Pre-requisites for this course (if any): Data Analysis 2
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>Upon completion of this course, students will be able to explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP). Topics covered in this course include: Parsing and syntax, stochastic tagging, machine translation, discourse processing, dialogue systems and natural language generation/summarization.</p>
<p>2. Course Main Objective</p> <p>The objective of this course is to equip students with various techniques that can be applied in the natural language processing field. In particular, the course aims can be summarized as follows:</p> <ul style="list-style-type: none"> • Understand approaches to syntax and semantics in NLP. • Understand approaches to discourse, generation, dialogue and summarization within NLP. • Understand current methods for statistical approaches to machine translation.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Identify fundamental natural language processing techniques and tools.	K1
1.2	Explain the role of math and technology for language processing to solve real-world problems in a range of fields.	K3
2	Skills:	
2.1	Apply appropriate statistical methods and computational techniques to process natural language to support problem solving.	S1, S5
2.2	Develop reasonable research methods in Natural Language Processing for different fields.	S3
3	Values:	
3.1	Apply research skills into natural language processing to generate innovative solutions that benefit society and improve decision-making.	V1, V2
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with natural language processing.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Natural Language Processing	4
2	Estimation Techniques, and Language Modeling	4
3	Parsing and Syntax	8
4	Stochastic Tagging, and Log-Linear Models	4
5	Machine Translation	4
6	Discourse Processing	8
7	Dialogue Systems	4
8	Natural Language Generation/Summarization	4
Total		40

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	Identify fundamental natural language processing techniques and tools.	Lectures Discussions	Exams and quizzes Problem class discussions
1.2	Explain the role of math and technology for language processing to solve real-world problems in a range of fields.	Lectures Discussions	Exams and quizzes Problem class discussions
2.0	Skills		
2.1	Apply appropriate statistical methods and computational techniques to process natural language to support problem solving.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	Develop reasonable research methods in Natural Language Processing for different fields.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
3.0	Values		
3.1	Apply research skills into natural language processing to generate innovative solutions that benefit society and improve decision-making.	Lectures Discussions Labs	Homework and assignments Class discussions
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with natural language processing.	Lectures Discussions Labs	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	40%
2	Lab Assessment	12	25%
3	Midterm Exam	6	15%
4	Assignments	2-11	20%
6			

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Introduction to Natural Language Processing by Jacob Eisenstein, 2019, MIT Press. ISBN-10: 0262042843. ISBN-13: 978-0262042840 Jurafsky, David, and James H. Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition. Upper Saddle River, NJ: Prentice-Hall, 2000. ISBN: 0130950696
Essential References Materials	Manning, Christopher D., and Hinrich Schütze. Foundations of Statistical Natural Language Processing. Cambridge, MA: MIT Press, 1999. ISBN: 0262133601
Electronic Materials	University E-learning platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom Lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Special Topic in Data Science
Course Code:	DS3052
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
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<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1. Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 3 rd or 4 th year
4. Pre-requisites for this course (if any): Applied Data Mining
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

Students will learn about emerging technologies and trends in Data Science. This course is divided into several modules. Each module represents a specialized body of knowledge focusing on the technical aspects of data analytics, as well as policy and other aspects such as privacy and ethics. Students will also get a chance to research state-of-the-art Data Science in an industry of their choice. This course will provide students the required breadth to jumpstart their career in the Data Science field.

2. Course Main Objective

The objective of this course is to equip students with various techniques and skills required for a career in data science. Students will take the initiative to research emerging topics in data science to come up with effective and innovative data-oriented solutions for real-world problems in a field of their choice.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Discuss emerging data science techniques and tools.	K1
1.2	Explain how math and technology can back data science to solve real-world problems in a range of fields.	K3
2	Skills:	
2.1	Apply appropriate statistical methods and computational techniques to build data-oriented solutions to support decision making.	S1, S4
2.2	Develop reasonable research methods in data science.	S3
3	Values:	
3.1	Apply research skills into data science to generate innovative solutions that benefit society and improve decision-making.	V1, V2
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with data.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to the course	4
2	Capturing, managing and using data for decision making	4
3	Using tools for mining different types of data: structured data, text data, and web data	12
4	Building the technology stack for Data Science	4
5	Research Emerging Data Science techniques in different industries	12
6	Show casing projects	4
Total		40

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	Discuss emerging data science techniques and tools.	Lectures Discussions	Exams and quizzes Problem class discussions
1.2	Explain how math and technology can back data science to solve real-world problems in a range of fields.	Lectures Discussions	Exams and quizzes Problem class discussions
2.0	Skills		
2.1	Apply appropriate statistical methods and computational techniques to build data-oriented solutions to support decision making.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
2.2	Develop reasonable research methods in data science.	Lectures Discussions Cooperative learning	Practical assignments Exams and quizzes Practical projects
3.0	Values		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.1	Apply research skills into data science to generate innovative solutions that benefit society and improve decision-making.	Lectures Discussions Labs	Homework and assignments Class discussions
3.2	Act professionally, ethically, and responsibly with high moral standards when dealing with data.	Lectures Discussions Labs	Homework and assignments Class discussions

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	40%
2	Lab Assessment	12	25%
3	Midterm Exam	6	15%
4	Assignments	2-11	20%
6			

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Learning to Love Data Science: Explorations of Emerging Technologies and Platforms for Predictive Analytics, Machine Learning, Digital Manufacturing and Supply Chain Optimization By Mike Barlow, O'Reilly, 2015, ISBN-10 : 9781491936580
Essential References Materials	Storytelling with Data: A Data Visualization Guide for Business Professionals by Cole Nussbaumer Knaflic, Wiley, 2015, ISBN-10 : 1119002257
Electronic Materials	University E-learning platform
Other Learning Materials	Selected papers by the course instructor

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom Lab
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show Smart Board

Item	Resources
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students' feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	

Course Title:	Time Series and Forecasting
Course Code:	DS3057
Program:	Bachelor of Data Science
Department:	Information Science
College:	Computer and Information Systems
Institution:	Umm Al-Qura University

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1. Course Description.....	3
2. Course Main Objective.....	3
3. Course Learning Outcomes.....	3
<u>C. Course Content</u>	4
<u>D. Teaching and Assessment</u>	4
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	4
2. Assessment Tasks for Students	4
<u>E. Student Academic Counseling and Support</u>	5
<u>F. Learning Resources and Facilities</u>	5
1.Learning Resources	5
2. Facilities Required.....	5
<u>G. Course Quality Evaluation</u>	5
<u>H. Specification Approval Data</u>	6

A. Course Identification

1. Credit hours: 3
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 4 th year
4. Pre-requisites for this course (if any): Data Modeling 2
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description

This course covers topics in time series analysis and some statistical techniques on forecasting. The course will not include a deep exploration of theory. Rather, the goal is for students by the end to be able to analyze time series data competently and use forecasting techniques to make informed decisions. Students will learn time series regression, decomposition methods, exponential smoothing, and the Box-Jenkins forecasting methodology.

2. Course Main Objective

The objective of this course is to equip students with various forecasting techniques and knowledge on modern statistical methods for analyzing time series data in various fields. And at the same time, equip them with adequate statistical tools and knowledge to make precise decisions, based on forecasts obtained from the statistical analysis of historical data.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Understand the fundamental advantage and necessity of forecasting in various situations.	K2
1.2	Know how to choose an appropriate time series analysis and forecasting method in a particular environment.	K1, K3
2	Skills:	
2.1	An ability to choose the appropriate statistical methods and computational techniques to collect and analyze time series data.	S1, S4
2.2	Generate reasonable forecast values for different fields.	S1, S3
2.3	Make concise decisions based on forecasts obtained.	S1
3	Values:	
3.1	Demonstrate own learning and professional development.	V3
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities.	V3
3.3	Act professionally, ethically, and responsibly with high moral standards when dealing with data	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to time series and forecasting	4
2	Time Series Regression Models	8
3	Time Series Decomposition	8
4	Exponential Smoothing	4
5	Box-Jenkins ARIMA Models	8
6	Forecasting and Some Practical Forecasting Issues	8
Total		40

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	Understand the fundamental advantage and necessity of forecasting in various situations.	Assign open-ended questions Brainstorming	Exams and quizzes Problem class discussions
1.2	Know how to choose an appropriate time series analysis and forecasting method in a particular environment.	Assign open-ended questions	Exams and quizzes
2.0	Skills		
2.1	An ability to choose the appropriate statistical methods and computational techniques to collect and analyze time series data.	Lectures Assign open-ended questions Use cooperative learning	Practical assignments Exams and quizzes Practical projects
2.2	Generate reasonable forecast values for different fields.	Lectures	Practical assignments

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Assign open-ended questions Use cooperative learning	Exams and quizzes Practical projects
2.3	Make concise decisions based on forecasts obtained.	Lectures Assign open-ended questions Use cooperative learning	Practical assignments Exams and quizzes Practical projects
3.0	Values		
3.1	Demonstrate own learning and professional development.	Lectures Use cooperative learning	Practical assignments Practical project
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities.	Brainstorming Use cooperative learning	Problem class discussions Practical project
3.3	Act professionally, ethically, and responsibly with high moral standards when dealing with data	Use cooperative learning	Practical project
3.4	Apply research skills into time series analysis to generate innovative solutions and forecasts that benefit society and improve business decision-making.	Lectures Use cooperative learning	Practical assignments Practical project

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Final Exam	13	40%
2	Lab Assessment	12	25%
3	Midterm Exam	6	15%
4	Assignments	2-11	20%
6			

*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 between 2-3 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Forecasting: Principles and Practice, 2021, 3 rd Edition, By Rob J Hyndman, George Athanasopoulos. ISBN: 0987507133
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Essential References Materials	
Electronic Materials	University E-learning platform
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom Lab
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)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Course survey and students feedback (Indirect)
Extent of achievement of course learning outcomes	Faculty, Program Leaders, Peer Reviewer	Self-evaluation Course report Visiting instructors (Direct)
Quality of learning resources	Faculty members	Learning resources evaluation survey (Direct)

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	