

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Data Mining

Course Code: 14016165-3

Date: 2018 –10 – 21.

Institution: Umm Al-Qura University

College: College of Computer and Information Systems **Department:** Department of Computer Science

A. Course Identification and General Information

1. Course title and code: Data Mining 14016165-3

2. Credit hours: 3

3. Program(s) in which the course is offered. Master of Computer Science (Artificial Intelligence)
(If general elective available in many programs indicate this rather than list programs)

4. Name of faculty member responsible for the course Dr. Muhammad Arif

5. Level/year at which this course is offered: 2 or 3

6. Pre-requisites for this course (if any):

7. Co-requisites for this course (if any):

8. Location if not on main campus:

9. Mode of Instruction (mark all that apply):

- | | | | |
|-------------------------------------|----------------------|-------------|----------------------------------|
| a. Traditional classroom | <input type="text"/> | percentage? | <input type="text" value="100"/> |
| b. Blended (traditional and online) | <input type="text"/> | percentage? | <input type="text"/> |
| c. E-learning | <input type="text"/> | percentage? | <input type="text"/> |
| d. Correspondence | <input type="text"/> | percentage? | <input type="text"/> |
| f. Other | <input type="text"/> | percentage? | <input type="text"/> |

Comments:

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of data mining to analyze large datasets.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

The contents will be prepared from globally recognized text books, web-based reference materials and latest research in the field. Practical home works and a term project related to latest tools and techniques will also be designed. At the end of the course, a seminar day can be announced in which students can present their course projects and literature review.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

Data Mining studies algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data. It is currently regarded as the key element of a more general process called Knowledge Discovery that deals with extracting useful knowledge from raw data. The knowledge discovery process includes data selection, cleaning, coding, using different statistical and machine learning techniques, and visualization of the generated structures.

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact hours
Introduction to data mining	1	3
Data Warehouse	2	6
Data preprocessing	1	3
Data mining knowledge representation	1	3
Attribute-oriented analysis	1	3
Data mining algorithms: Association rules	2	6
Data mining algorithms: Classification	2	6
Data mining algorithms: Prediction	1	3
Evaluation measures	1	3
Clustering	1	3
Advanced techniques, Data Mining software and applications	1	3

2. Course components (total contact and credit hours per semester):

	Lecture	Tutorial	Laboratory/	Practical	Other	Total
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				Studio			
Contact Hours	Planned	42					42
	Actual	42					42
Credit	Planned	3					3
	Actual	3					3

3. Individual study/learning hours expected for students per week.

9-12

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		
1.1	Understand basics of data mining	Lectures	Exam, Quizzes
1.2	Understand data preprocessing and knowledge representation	Lectures	Exams, Homework, Quizzes
1.3	Understand different data mining and clustering algorithms in real world applications	Lectures	Exam, Homework, Quizzes
1.4	Identify current tools for data mining applications	Lectures, Project	Exam, Homework, Project report
2.0	Cognitive Skills		
2.1	Design, implement and evaluate data mining algorithms	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate data mining algorithms using evaluation measures	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate real world data mining application	Group discussion, Project	Project Report, Project presentation
3.0	Interpersonal Skills & Responsibility		

3.1	Work effectively in groups to accomplish a common goal and show leadership qualities	Small group discussion, research activities, Projects	Project Report, Group presentation
3.2	Act ethically and responsibly with high moral standards	Research activities, Project	Anti-plagiarism Presentation
4.0	Communication, Information Technology, Numerical		
4.1	Ability to communicate clearly in oral and written form with range of audiences	Project	Project Report, Project presentation
4.2	Demonstrate the ability to apply recent tools in Data mining application	Project	Project Report, Project presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of data mining algorithms	Lecture, Case studies	Exams, homework
5.0	Psychomotor (if any)		
5.1	Ability to operate and construct necessary tools required related to the subject	Research activities, Projects	Project, HWs, presentations

5. Assessment Task Schedule for Students During the Semester			
	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Quiz 1	2	3.3%
2	Homework 1	3	3.3%
3	Quiz 2	4	3.3%
4	Homework 2	5	3.3%
5	Midterm Exam	7	20%
6	Quiz 3	8	3.3%
7	Homework 3	9	3.3%
8	Project	11	30%
9	Final Exam	14	30%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- i. Office Hours for student counseling and support – Three hours/week
- ii. Availability of teaching Staff on e-learning resources like uqu20/Piazza

E Learning Resources

1. List Required Textbooks

- i. Han, Jiawei, Jian Pei, and Micheline Kamber. Data mining: concepts and techniques. Elsevier, latest edition.
- ii. Witten, Ian H., Eibe Frank, Mark A. Hall, and Christopher J. Pal. Data Mining: Practical machine learning tools and techniques. Morgan Kaufmann, latest edition.

2. List Essential References Materials (Journals, Reports, etc.)

- i. Recent Papers in Data Mining related journals

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

- i.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

- i. MATLAB, Python or similar software

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)

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

- i. One classroom (25 seats)
- ii. One lab (25 PCs)

2. Technology resources (AV, data show, Smart Board, software, etc.)

- i. Whiteboard
- ii. Internet connection
- iii. Anti-plagiarism software

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching

<p>i. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.</p>
<p>2. Other Strategies for Evaluation of Teaching by the Instructor or the Department</p> <p>i. Course file of the course will be maintained and evaluated by some senior faculty member.</p> <p>ii. Instructor evaluation is performed for every semester</p>
<p>3. Procedures for Teaching Development</p> <p>i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.</p>
<p>4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)</p> <p>i. A random sample from the marked papers may be evaluated by an independent senior faculty member.</p> <p>ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.</p>
<p>5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.</p> <p>i. Department has curriculum committee that periodically review courses.</p> <p>ii. Faculty council review offer program as per need.</p>

Name of Course Instructor: Dr. Muhammad Arif

Signature: Muhammad Arif **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____