جامعة أم القرى

كلية الحاسب الآلي ونظم المعلومات

الماجستير في علوم الحاسب الآلي برسالة

4. Learning and Teaching

4/1 Learning Outcomes and Graduate Specifications

4/1/1 Main tracks or specializations covered by the program:

(a) Software Engineering
(b) Cyber Security
(c) Data Science
(d) General CS

4/1/2 Curriculum Study Plan Table (Courses & Thesis)

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 1	14016101-3	Advanced Software Engineering	Required	---	3
	14016102-3	Advanced Database Systems	Required	---	3
	14016103-3	Advanced Operating System	Required	---	3
	14016104-3	Research Methods in CS	Required	---	3
Level 2	14016201-3	Algorithms Design	Required	---	3
	14016202-1	MS Group Project	Required	---	1
	14016xxx-3	Elective 1	Elective	see elective list	3
	14016xxx-3	Elective 2	Elective	see elective list	3
	14016xxx-3	Elective 3	Elective	see elective list	3
Level 3	14016301-2	Independent Studies I	Required	14016104-3	2
	14016403-10	Thesis	Required	14016104-3	0
Level 4	14016401-2	Independent Studies II	Required	14016301-2	2
	14016403-10	Thesis	Required	14016104-3	10
		Total			39

Elective Courses – Software Engineering Track

Serial Number	Level	Course ID	Course Name	Pre-Requisite
1	3	14016331-3	Computer Systems Programming	14016101-3
2	3	14016332-3	Design Patterns	14016101-3
3	3	14016333-3	Functional and Concurrent Programming	14016101-3
4	3	14016334-3	Mobile Applications Development	14016101-3
5	3	14016335-3	Service Oriented Architecture	14016101-3
6	3	14016336-3	Simulation Modelling for Computer Science	14016101-3
7	3	14016337-3	Software Architecture	14016101-3
8	3	14016338-3	Software Project Management and Development	14016101-3
9	3	14016339-3	Software Testing	14016101-3
10	3	14016431-3	Web Application Development	14016101-3
11	3	14016432-3	Advanced topics in Software Engineering	14016101-3

Elective Courses – Cyber Security Track

Serial Number	Level	Course ID	Course Name	Pre-Requisite
1	3	14016321-3	Cryptography Fundamentals	14016103-3
2	3	14016322-	Cyber Defense in Web-Based Attacks	14016103-3
3	3	14016323-3	Cyber Security and Digital Crime	14016103-3
4	3	14016324-3	Digital Forensics and Investigations	14016103-3
5	3	14016325-3	Ethical Hacking and Penetration Testing	14016103-3
6	3	14016326-3	Mobile Security	14016103-3
7	3	14016327-3	Securing Enterprise Infrastructure using Security Techniques	14016103-3
8	3	14016328-3	Introduction to Blockchain	14016103-3
8	3	14016428-3	Advanced Topics in Cyber Security	14016103-3

Elective Courses – Data Science Track

Serial Number	Level	Course ID	Course Name	Pre-Requisite
1	3	14016311-3	Cloud Computing and Big Data	14016102-3
2	3	14016312-3	Data Management and Governance	14016102-3
3	3	14016313-3	Data Mining	14016102-3
4	3	14016314-3	GIS Analytics	14016102-3
5	3	14016315-3	Information Retrieval and Web Search	14016102-3
6	3	14016316-3	Social Media Analytics	14016102-3
7	3	14016417-3	Healthcare analytics	14016102-3
8	3	14016418-3	Business Analytics	14016102-3
9	3	14016419-3	Advanced topics in Data Science	14016102-3

Elective Courses – General Computer Science Courses

Serial Number	Level	Course ID	Course Name	Pre-Requisite
1	3	14016341-3	Introduction to Bio-Informatics	
2	3	14016342-3	Distributed Systems	
3	3	14016343-3	High Performance Computing	
4	3	14016344-3	Introduction to Robotics	
5	3	14016345-3	IoT Systems	
6	3	14016346-3	IT and Entrepreneurship	
7	3	14016347-3	Wireless Communications and Networks	
8	3	14016448-3	Advanced topics in Computer Science	

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advanced Software Engineering

Course Code: 14016101-3

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: Advanced Software Engineering 14016101-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Basem Alkazemi
5. Level/year at which this course is offered: 1
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of software engineering techniques and tools to build enterprise software systems.

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 coursework and prototypes.

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

Course Description:

The course aims to develop the broad understanding of the discipline of software engineering by considering the wider systems engineering context in which software plays a role. It aims to examine the concepts and techniques associated with a number of advanced and industrially relevant topics, relating to both the product and processes of software engineering. It seeks to complement this with an account of the associated practical and professional issues in software engineering. The course will also provide an on-going project to directly support the group project work.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Embedded software and systems engineering	2	6
Project Management - Project Planning and Scheduling	2	6
Software Engineering Process	3	9
Software Architecture	3	9
Distributed Software Architectures using Middleware	2	6
Advanced Modelling	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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 standards of software engineering	Lectures	Exam, Quizzes
1.2	Understand component based development	Lectures	Exams, Homework, Quizzes
1.3	Understand different agile process models	Lectures	Exam, Homework, Quizzes
1.4	Identify current tools for software modelling	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	Realize the application of agile process models	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate software quality using quality metrics	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate real world 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 software engineering application	Project	Project Report, Project presentation
4.3	Demonstrate the ability to use formal and statistical techniques in the design and analysis of software applications	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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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. Mall, R. (2018). Fundamentals of software engineering. PHI Learning Pvt. Ltd..
2. List Essential References Materials (Journals, Reports, etc.) Recent Papers in software engineering related journals such as: i. Mosterman, P. J., & Zander, J. (2016). Cyber-physical systems challenges: a needs analysis for collaborating embedded software systems. Software & Systems Modeling, 15(1), 5-16. ii. Paz, F., & Pow-Sang, J. A. (2016). A systematic mapping review of usability evaluation methods for software development process. International Journal of Software Engineering and Its Applications, 10(1), 165-178.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. i. Java or any object-oriented programming, UML.

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 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.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Basem Alkazemi

Signature: *Basem Alkazemi* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advanced Database

Course Code: 14016102-3

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: Advanced Database 14016102-3		
2. Credit hours: 3		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Basem Alkazemi		
5. Level/year at which this course is offered: 1		
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	percentage?	100
b. Blended (traditional and online)	percentage?	
c. E-learning	percentage?	
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of database systems management and operation in addition to intensive SQL hands-on.

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 coursework and prototypes.

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

Course Description:

Advanced database systems deals with current and emerging database technologies which enable us to handle complex applications. This course provides a comprehensive understanding of data modeling techniques and issues, relational databases and SQL queries, and emerging database technologies and issues.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Relational Algebra	1	3
PL/SQL	2	6
Triggers	1	3
XML in Oracle SQL	2	6
Distributed database	1	3
concurrency control	1	3
Performance Tuning	2	6
Temporal and spatial databases	1	3
Database design principles	1	3
Object-oriented database	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact	Planned	42					42

Hours	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 PL/SQL accessing tables	Lectures	Exam, Quizzes
1.2	Understand Triggers in PL/SQL	Lectures	Exams, Homework, Quizzes
1.3	Understand XML in Oracle SQL	Lectures	Exam, Homework, Quizzes
1.4	Identify current tools for Performance Tuning	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	Design, implement data models for application domains	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate of data modelling and representation	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate real world database application system	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 database management	Project	Project Report, Project presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in generating data representations and modelling	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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks ii. Susan Boardman, Melanie Caffrey, Solomon Morse, and Benjamin Rosenzweig Oracle Web Application Programming for PL/SQL Developers The Prentice Hall PTR Oracle Series, 2003.
2. List Essential References Materials (Journals, Reports, etc.) iii. Recent Papers in database related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. ii. SQL, JDBC, Java.

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.) iii. One classroom (25 seats) iv. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) iv. Whiteboard v. Internet connection vi. 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

ii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department iii. Course file of the course will be maintained and evaluated by some senior faculty member. iv. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development ii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) iii. A random sample from the marked papers may be evaluated by an independent senior faculty member. iv. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. iii. Department has curriculum committee that periodically review courses. iv. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Basem Alkazemi

Signature: *Basem Alkazemi* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advanced Operating Systems

Course Code: 14016103-3

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: Advanced Operating Systems 14016103-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Murtaza Ali Khan			
5. Level/year at which this course is offered: 1			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

This course is intended to give a broad exposure to advanced operating systems topics.

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:

We will cover topics such as operating system kernels, file systems, memory management, synchronization mechanisms, naming, protection, security, multiprocessing model, inter-process communication; resource management and sharing, distributed and network operating systems. In addition, students will be exposed to recent developments in operating systems through research projects and papers.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Review of Operating Systems	1	3
File Systems	1	3
Memory Management	2	6
Synchronization Mechanisms	2	6
Protection and Security	2	6
Multiprocessing Model	1	3
Resource Management and Sharing	1	3
Distributed and Network Operating Systems	2	6
Real-time Operating Systems	1	3
Virtualization	1	3

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

	Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total

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 the fundamental principles of operating system	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Ability to apply knowledge of operating systems to efficiently utilize the system resources	Lecture, Group discussion	Exam, HWs, Quizzes
1.3	Ability to apply knowledge of operating systems to diagnose and trouble shoot the system level problems	Lecture, Group discussion	Exams, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Apply conceptual understanding of operating for systems analysis and design	Lecture, Project	Exam, HWs
2.2	Investigate the real-world problems in the context of operating systems and design efficient solutions	Lecture, Project	Project Report, Project presentation
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation

3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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
4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of operating systems.	Lecture, Case studies, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate various operating systems, e.g., Linux, Windows, Android, etc.	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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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. Operating System Concepts, by Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne, John Wiley & Sons, 2018. ISBN: 9781119439257. ii. Operating Systems: Internals and Design Principles, by William Stallings, Prentice Hall, 2015. ISBN 9781292061351.
2. List Essential References Materials (Journals, Reports, etc.) i. Springer Journal, Distributed Computing ii. Springer Journal, Real-Time Systems
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. i. https://link.springer.com/journal/11241
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. i. Virtual machine that runs Linux operating system. ii. Java Development Kit (JDK) and IDE, e.g., NetBeans

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
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

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.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Murtaza Ali Khan

Signature: *Murtaza Ali Khan* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Research Methods in CS

Course Code: 14016104-3

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: Research Methods in CS 14016104-3		
2. Credit hours: 3		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Murtaza Ali Khan		
5. Level/year at which this course is offered: 1		
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		percentage? 100
b. Blended (traditional and online)		percentage?
c. E-learning		percentage?
d. Correspondence		percentage?
f. Other		percentage?
Comments:		

B Objectives

1. The main objective of this course

This course provides a graduate-level study of research methods.

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 course will teach state of the art theoretical and practical knowledge in the field of research methods. Students will be assigned assignments and project to implement the research methods techniques to get hands on experience. At the end of the course, a seminar/presentation event will take place in which students will present their course projects/research work.

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

Course Description:

In this course, we will study research methods used in computer science. The course will cover topics such as experiment design, simulations, statistics, analysis of data, etc. Students will learn various aspects of reading, writing, evaluating papers, and presenting research. There will be assignments during the semester allowing the students to practice different research skills and methodologies covered in the lectures. There will be a semester-long project in which students select, design, and execute research project and present the result at the end of the semester.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Experiment design	1	3
Computer based simulation	1	3
Statistical analysis of data	2	6
Graphs and visualization of data	2	6
Ethics of research	1	3
Accessing research material	1	3
Reading research papers	1	3
Writing research papers	2	6
plagiarism	1	3
Peer review	1	3
Presenting research work	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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 the fundamental of Research Methods	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Ability to apply knowledge of Research Methods in publications, review and presentation	Lecture, Group discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Apply conceptual understanding of Research Methods	Lecture, Project	Exam, HWs
2.3	Ability to understand publication process used in academic community	Lecture, Project	Project Report, Project presentation
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation

3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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	Use of computing tools used in research	Lecture, Project	Project Report, Project presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in research methods	Lecture, Case studies, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		

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	HW 1	2	5%
2	HW 2	3	5%
3	HW 3	5	5%
4	HW 4	6	5%
5	Midterm Exam	8	20%
6	Writing Research Paper	10	40%
7	Presentation	15	20%

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. John W. Creswell and J. David Creswell. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. SAGE Publications, latest edition. ii. Nigel G. Fielding (Editor), Raymond M. Lee (Editor), Grant Blank (Editor). The SAGE Handbook of Online Research Methods. SAGE Publications, latest edition.
2. List Essential References Materials (Journals, Reports, etc.) i. Recent research papers in related to Research Methods
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. i. Access to research databases, e.g., IEEE, ACM, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. i. Decided by the course instructor

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)
2. Technology resources (AV, data show, Smart Board, software, etc.) i. Whiteboard ii. Internet connection
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

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.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Murtaza Ali Khan

Signature: *Murtaza Ali Khan* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Algorithm Design

Course Code: 14016201-3

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: Algorithm Design 14016201-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Murtaza Ali Khan
5. Level/year at which this course is offered: Level 2 in Year 1
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

Algorithm design and analysis is a fundamental and important part of computer science. This course introduces students to advanced techniques for the design and analysis of algorithms and explores a variety of applications.

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:

The topics include amortized analysis, probabilistic analysis, competitive analysis, branch-and-bound, hashing. NP-complete problem, Bipartite matching, nearest neighbor algorithms, randomization, scheduling, geometric algorithms: convex hull, closest pair.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Review of Algorithm	1	3
Algorithm Analysis	2	6
Branch-and-Bound Algorithms	2	6
Hashing	1	3
NP-Complete Problem	2	6
Bipartite Matching	1	3
Nearest Neighbor Algorithms	1	3
Randomized Algorithms	1	3
Scheduling	1	3
Geometric Algorithms	2	6

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

	Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total

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 the fundamental principles of algorithm analysis	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Ability to apply knowledge of algorithms to design time & space efficient algorithms	Lecture, Group discussion	Exam, HWs, Quizzes
1.3	An ability to recognize the use of algorithms for real life problem solving	Lecture, Group discussion	Exam, HWs, Quizzes
1.4	Develop ability to identify current techniques, skill, and tools necessary for the development of algorithms.	Lecture, Group discussion	Exams, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Apply conceptual understanding of algorithms analysis and design principles	Lecture, Project	Exam, HWs
2.2	Analyze algorithms in terms of time and space efficiency	Lecture, Case studies,	Exams, Reports
2.3	Investigate the real-world problems in the context of algorithms and design efficient algorithms	Lecture, Project	Project Report, Project presentation
3.0	**Interpersonal Skills & Responsibility**		

3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation
3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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	Use of latest algorithm development tools (compilers, debugger, IDEs, etc.)	Lecture, Project	Project Report, Project presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of algorithms.	Lecture, Case studies, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for implementation of algorithms on various platforms	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	HW 1	2	5%
2	Quiz 1	3	5%
3	HW 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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. Algorithms: Design Techniques and Analysis by M. H. Alsuwaiyel (Revised edition), 2016, ISSN: 9789814723664 ii. Algorithms by Robert Sedgewick and Kevin Wayne, 2014. ISSN: 9780133799101
2. List Essential References Materials (Journals, Reports, etc.) ii. ELSEVIER, Journal of Discrete Algorithms iii. Springer Journal, Algorithmica iv. Introduction to Algorithms by Thomas H. Cormen and Charles E. Leiserson (latest edition)
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. i. https://link.springer.com/journal/453
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. i. MATLAB, MS Visual Studio, Python for programmming

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
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 ii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Othewr Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Murtaza Ali Khan

Signature: *Murtaza Ali Khan* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: MS Group Project

Course Code: 14016202-1

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: MS Group Project 14016202-1
2. Credit hours: 1
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Murtaza Ali Khan
5. Level/year at which this course is offered: Level 2 in Year 1
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		percentage?	
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	100

Comments:

B Objectives

1. The main objective of this course

The main objective of MS Group Projects to provide students an opportunity to investigate a real-life problem, related to their field of study, and find its solution that demonstrate the skills they learnt during the master program. The project requires students to work collaboratively on an area of interest with the support of an advisor.

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)

A committee will be formed to evaluate the proposals of projects. To improve the quality of research, the committee may ask to enhance to scope of a group project. Students will be encouraging to choose group project from the latest trends in any field of Computer Science.

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

Course Description:

For group project, a group of students must choose a topic related to Computer Science in any track, which they would like to do a scientific group project. The main parts of a group project are: doing actual research, implementation (e.g., programming), writing about the results, and presenting the results.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
TBA (To Be Announced)		

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	As needed					As needed
	Actual	As needed					As needed
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	An ability to recognize the use of Computer Science in solving real life problems	Discussion with advisor	Seminar Presentation
1.2	An ability to identify current techniques, skills, and tools necessary for the development of computer-based systems	Discussion with advisor	Seminar Presentation
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate Computer Science related system, process, component, or program to meet desired needs.	Discussion with advisor	Seminar Presentation
2.2	Investigate real world problems in the context of Computer Science and design innovative solutions	Discussion with advisor	Seminar Presentation
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Discussion with advisor	Seminar Presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Discussion with advisor	Seminar Presentation
3.3	Act ethically and responsibly with high moral standards	Discussion with advisor	Seminar Presentation
4.0	**Communication, Information Technology, Numerical**		
4.1	Ability to communicate clearly in oral and written form with range of audiences	Discussion with advisor	Seminar Presentation
4.2	Use of latest information technologies	Discussion with advisor	Seminar Presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of intelligent systems	Discussion with advisor	Seminar Presentation

5.0	Psychomotor (if any)		
5.1	Ability to operate and construct necessary tools required for computing system	Discussion with advisor	Seminar Presentation

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	Presentation of Group project	1-14	100%

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

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

i. To be decided based on the topic of project

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

i. The IEEE Computer Society
https://www.computer.org/
ii. Association for Computing Machinery
https://www.acm.org/

4. Other learning material such as computer-based programs/CD, professional standards or regulations and 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. Graduate student lab with PCs
ii. Seminar room

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

i. Whiteboard
ii. Internet connection

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 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.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development ii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Murtaza Ali Khan

Signature: *Murtaza Ali Khan* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: : Independent Studies I

Course Code: 14016301-2

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: Independent Studies I (14016301-2)
2. Credit hours: 2
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Murtaza Ali Khan
5. Level/year at which this course is offered: Level 4 / year 2
6. Pre-requisites for this course (if any): 14016202-3
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		percentage?	
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	100

Comments:

B Objectives

1. The main objective of this course

The aim of this course is preparing student to self-study advance topics in computer science. Students are encouraged to choose topic current literature. The specific content of an offering of the course should focus on a specific area of computer science.

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. 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:

In this course students will self-study choose topic in the field of Computer science. At the end of the course, a seminar/presentation event will take place in which students will present their course projects/research work.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
TBA (To Be Announced)	1-14	42

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	As needed					As needed
	Actual	As needed					As needed
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	An ability to recognize the use of computer science in solving real life problems	Discussion with advisor	Seminar Presentation
1.2	An ability to identify current techniques, skills, and tools necessary for the development of computer-based systems	Discussion with advisor	Seminar Presentation
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate computer science related system, process, component, or program to meet desired needs.	Discussion with advisor	Seminar Presentation
2.2	Investigate real world problems in the context of computer science and design innovative solutions	Discussion with advisor	Seminar Presentation
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Discussion with advisor	Seminar Presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Discussion with advisor	Seminar Presentation
3.3	Act ethically and responsibly with high moral standards	Discussion with advisor	Seminar Presentation
4.0	**Communication, Information Technology, Numerical**		
4.1	Ability to communicate clearly in oral and written form with range of audiences	Discussion with advisor	Seminar Presentation
4.2	Use of latest information technologies	Discussion with advisor	Seminar Presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of intelligent systems	Discussion with advisor	Seminar Presentation

5.0	Psychomotor (if any)		
5.1	Ability to operate and construct necessary tools required for computing system	Discussion with advisor	Seminar Presentation

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	Presentation of Independent Studies	14	100%

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. Decided by advisor
2. List Essential References Materials (Journals, Reports, etc.) i. Recent Papers in computer science research
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. iii. The IEEE Computer Society, https://www.computer.org/ iv. Association for Computing Machinery, https://www.acm.org/
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. i. Decided by advisor

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. Seminar room ii. lab (if needed)
2. Technology resources (AV, data show, Smart Board, software, etc.) i. Whiteboard ii. Internet connection
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 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.

2. Other Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Murtaza Ali Khan

Signature: *Murtaza Ali Khan* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Independent Studies II

Course Code: 14016401-2

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: Independent Studies II 14016401-2
2. Credit hours: 2
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Murtaza Ali Khan
5. Level/year at which this course is offered: Level 4 / Year 2
6. Pre-requisites for this course (if any): 14016301-2
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		percentage?		
b. Blended (traditional and online)		percentage?		
c. E-learning		percentage?		
d. Correspondence		percentage?		
f. Other		percentage?	100	

Comments:

B Objectives

1. The main objective of this course

The aim of this course is preparing student to self-study advance topics in computer science. Students are encouraged to choose topic current literature. The specific content of an offering of the course should focus on a specific area of computer science.

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. 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:

In this course students will self-study choose topic in the field of Computer science. At the end of the course, a seminar/presentation event will take place in which students will present their course projects/research work.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
TBA (To Be Announced)	1-14	42

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	As needed					As needed
	Actual	As needed					As needed
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	An ability to recognize the use of computer science in solving real life problems	Discussion with advisor	Seminar Presentation
1.2	An ability to identify current techniques, skills, and tools necessary for the development of computer-based systems	Discussion with advisor	Seminar Presentation
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate computer science related system, process, component, or program to meet desired needs.	Discussion with advisor	Seminar Presentation
2.2	Investigate real world problems in the context of computer science and design innovative solutions	Discussion with advisor	Seminar Presentation
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Discussion with advisor	Seminar Presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Discussion with advisor	Seminar Presentation
3.3	Act ethically and responsibly with high moral standards	Discussion with advisor	Seminar Presentation
4.0	**Communication, Information Technology, Numerical**		
4.1	Ability to communicate clearly in oral and written form with range of audiences	Discussion with advisor	Seminar Presentation
4.2	Use of latest information technologies	Discussion with advisor	Seminar Presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of intelligent systems	Discussion with advisor	Seminar Presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for computing system	Discussion with advisor	Seminar Presentation

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	Presentation of Independent Studies	14	100%

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. Decided by advisor
2. List Essential References Materials (Journals, Reports, etc.) i. Recent Papers in Computer Science Research
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. i. The IEEE Computer Society, https://www.computer.org/ ii. Association for Computing Machinery, https://www.acm.org/
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. i. Decided by advisor

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.) iii. Seminar room iv. lab (if needed)
2. Technology resources (AV, data show, Smart Board, software, etc.) i. Whiteboard ii. Internet connection
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 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.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department

i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Murtaza Ali Khan

Signature: *Murtaza Ali Khan* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Thesis

Course Code: 14016403-10

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: Thesis 14016403-10		
2. Credit hours: 10		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Murtaza Ali Khan		
5. Level/year at which this course is offered: Level 3 and 4/ Year 2		
6. Pre-requisites for this course (if any): 14016104-3		
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		percentage?
b. Blended (traditional and online)		percentage?
c. E-learning		percentage?
d. Correspondence		percentage?
f. Other		percentage? 100
Comments:		

B Objectives

1. The main objective of this course

The main objective of research project is to provide students an opportunity to investigate a real-life problem, related to their field of study, and find its solution that demonstrate the skills they learnt during the master program. The project requires students to work independently on an area of interest with the support of a supervisor with the same expertise.

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)

A committee will be formed to evaluate the proposals of research projects. To improve the quality of research, the committee may ask to enhance to scope of a research project. Students will be encouraging to choose research project from the latest trends in the field of computer science.

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

Course Description:

For research project, each student must choose a topic related to computer science, which he/she would like to do a scientific research project. A student can select his/her one's own topic or guided by a faculty member to choose a research topic. The student must take initiative in finding advisor who will guide him/her during are research project. The main parts of a research project are: doing actual research, implementation (e.g., programming or simulation), writing about the results, and presenting the results.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
TBA (To Be Announced)		

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	As needed					As needed
	Actual	As needed					As needed
Credit	Planned	10					10
	Actual	10					10

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	An ability to recognize the use of computer science in solving real life problems	Discussion with advisor	Seminar Presentation
1.2	An ability to identify current techniques, skills, and tools necessary for the development of computer-based systems	Discussion with advisor	Seminar Presentation
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate computer science related system, process, component, or program to meet desired needs.	Discussion with advisor	Seminar Presentation
2.2	Investigate real world problems in the context of computer science and design innovative solutions	Discussion with advisor	Seminar Presentation
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Discussion with advisor	Seminar Presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Discussion with advisor	Seminar Presentation
3.3	Act ethically and responsibly with high moral standards	Discussion with advisor	Seminar Presentation
4.0	**Communication, Information Technology, Numerical**		
4.1	Ability to communicate clearly in oral and written form with range of audiences	Discussion with advisor	Seminar Presentation
4.2	Use of latest information technologies	Discussion with advisor	Seminar Presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of intelligent systems	Discussion with advisor	Seminar Presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for computing system	Discussion with advisor	Seminar Presentation

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	Presentation of Research Project	1-14	100%

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
2. List Essential References Materials (Journals, Reports, etc.) i. Recent Papers in Computer Science Research
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. i. The IEEE Computer Society, https://www.computer.org/ ii. Association for Computing Machinery, https://www.acm.org/
4. Other learning material such as computer-based programs/CD, professional standards or regulations and 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. Seminar room
2. Technology resources (AV, data show, Smart Board, software, etc.) i. Whiteboard ii. Internet connection
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 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.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member.

ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Murtaza Ali Khan

Signature: *Murtaza Ali Khan* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Computer Systems Programming

Course Code: 14016331-3

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: Computer Systems Programming (14016331-3)		
2. Credit hours: 3		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Mohamed K. Nour		
5. Level/year at which this course is offered: 1		
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	percentage?	100
b. Blended (traditional and online)	percentage?	
c. E-learning	percentage?	
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course

This course is meant to be a foundational course in computer systems programming.

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:

Computer systems programming involves developing software to connect the low-level computer hardware to high-level, user-facing application software and usually requires careful consideration of performance and resource constraints.
students will explore systems programming in the UNIX environment using the POSIX standard library. The course includes a series of programming assignments for students to put the principles they have learned into practice. Students will gain experience with UNIX software development including command line development tools, distributed version control, unit testing frameworks, continuous integration, debugging tools, and performance evaluation. In the final programming assignment, students will work in pairs to design, implement, test, and evaluate a high-performance handwriting recognition system which uses machine learning to automatically classify handwritten letters

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Overview of systems programming	1	3
Unix Environment: command line, globbing, I/O redirection, piping, basic commands.Memory layout. Debugging: GDB, valgrind, essential x86.	2	6
Directories, file properties and file systems	2	6
Terminal control and signals	1	3

Event driven programming	2	6
Processes and programs	1	3
i/o redirection and pipes	2	6
Servers and sockets	2	6
Threads	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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 systems programming	Lectures	Exam, Quizzes

1.2	Understand data and memory usage at low computer level	Lectures	Exams, Homework, Quizzes
1.4	Identify current tools for data mining applications	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	describe both basic and advanced algorithms and data structures and how to analyze these algorithms and data structures in terms of time and space complexity;	Lecture, Case studies	Exams, Quizzes, Homework
2.2	apply the C and C++ programming languages to implement algorithms and data structures using a variety of programming paradigms;	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	evaluate various algorithm and data structure alternatives and make a compelling theoretical and/or practical argument for why one approach is superior;	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 methods in systems application	Project	Project Report, Project presentation
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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks
iii. "All of Programming," by A. Hilton and A. Bracy (2015).. iv. R. Sedgewick. "Algorithms in C, Parts 1–4," 3rd ed., Addison-Wesley, 1998. v. M. Weiss. "Data Structures and Algorithm Analysis in C++," 4th ed., Pearson, 2013. vi. W.R. Stevens, S.A. Rago. "Adv. Programming in the UNIX Env.," 3rd ed., Addison-Wesley, 2013. vii. S. Myers. "Effective C++," 3rd ed., Addison-Wesley, 2005. viii. S. Myers. "More Effective C++," 1st ed., Addison-Wesley, 1996. ix. S. Myers. "Effective STL," 1st ed., Addison-Wesley, 2001. x. S. Myers. "Effective Modern C++," 1st ed., O'Reilly, 2014..
2. List Essential References Materials (Journals, Reports, etc.)
iv. Recent Papers in Systems Programming related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
iii. 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.) v. One classroom (25 seats) vi. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)

vii.	Whiteboard
viii.	Internet connection
ix.	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 iii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department v. Course file of the course will be maintained and evaluated by some senior faculty member. vi. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development iii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) v. A random sample from the marked papers may be evaluated by an independent senior faculty member. vi. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. v. Department has curriculum committee that periodically review courses. vi. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Mohamed K. Nour

Signature: *Mohamed K. Nour* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Design Patterns

Course Code: 14016332-3

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: Design Patterns
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr Mohamed K. Nour
5. Level/year at which this course is offered: 1
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

Design patterns are reusable design solutions to recurring design problems in some design contexts. Each design pattern has a specific motivation or purpose (WHY, WHY NOT), addresses a specific problem (WHAT), offers a specific design solution (HOW), and works in a specific design context (WHEN).

In addition to being a design aid, software design patterns also serve as a common vocabulary for software developers to communicate, document and explore design alternatives, and a learning tool, to help you, the student, to learn best practice in programming and a disciplined way to design programs.

Software patterns first became widely known through the famous 1992 "Gang of Four" (GoF) book, called Design Patterns, although the notion of patterns in this sense originated with the architect Christopher Alexander in the 1970s. Since the GoF book, many other design patterns have been identified, but few are as significant as the GoF design patterns.

Patterns can be applied from design to all other aspects of software development, such as coding, testing, requirements capture, software architecture, and so on. The focus of this course unit is on the software design patterns.

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:

This course unit will introduce 19 software design patterns from the GoF book and one software architectural pattern to the students. Students will learn how to use these patterns to the design and implementation of complex object-oriented software systems in the following ways:

At the design level, students will learn how to use patterns to design better software and how to use the Unified Modelling Language (UML) to represent patterns.

At the implementation, students will learn how to implement patterns using Java programming language.

Students will be required to put their learning into practice by undertaking a group project in which they will be asked to design and implement a complex object-oriented software system..

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
Motivation, principles and concepts behind design patterns	1	3
Description of design patterns by using a standard template	1	3
Representation of design patterns by using UML Class Diagram	1	3
Detailed explanation and illustration of patterns, from design to implementation, with examples	1	3
Structural patterns	2	6
Behavioural patterns	2	6
Creational patterns	2	6
Software architecture	2	6
Relationships between the fundamental principles of object-oriented program design and design patterns	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	What design patterns are for, how they work and why they are needed.	Lectures	Exam, Quizzes
1.2	How the design patterns can help solve software design problems.	Lectures	Exams, Homework, Quizzes
1.3	When and why to use each pattern, and the consequence of using the pattern.	Lectures	Exam, Homework, Quizzes
1.4	How to use design patterns to design and implement adaptable object-oriented software systems.	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate design patterns	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate code using design patters	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate real world applications using design patterns	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 patterns in software projects	Project	Project Report, Project presentation
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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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)

vii. Office Hours for student counseling and support – Three hours/week

viii. Availability of teaching Staff on e-learning resources like uqu20/Piazza

E Learning Resources

1. List Required Textbooks

i. Design pattern in Java, 2016, Vaskaran, Design patterns: elements of reusable Object-Oriented software

i. Gamma, E. et al 0201633612 Addison Wesley 1994

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

v. Recent Papers in Software Engineering related journals

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

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

iv. Java

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.)

vii. One classroom (25 seats)

viii. One lab (25 PCs)

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

x. Whiteboard

xi. Internet connection

xii. 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 iv. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department vii. Course file of the course will be maintained and evaluated by some senior faculty member. viii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development iv. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) vii. A random sample from the marked papers may be evaluated by an independent senior faculty member. viii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. vii. Department has curriculum committee that periodically review courses. viii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Mohamed K. Nour

Signature: *Mohamed K. Nour* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Functional and Concurrent Programming

Course Code: 14016333-3

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: Functional and Concurrent Programming 14016333-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Mohamed K. Nour
5. Level/year at which this course is offered: level 2 or 3
6. Pre-requisites for this course (if any): 14016101-3
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

In this course, we'll discover that choosing the appropriate abstractions can make concurrent programs readable and reasonable. Moreover, the course put emphasis on how functional programming supports concurrency.

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:

This module will introduce students to fundamental concepts of functional and concurrent programming, using a suitable language (e.g. Scala) as a vehicle to put these concepts into practice. The first part of the module will cover basic ideas in functional programming, such as expressions, types, values, lists, pattern-matching and recursion, together with the specific language concurrency model, including process creation, message sending and receiving. Good concurrent design practices will be considered, based on networks of communicating processes (e.g. Actor and CSP models), and avoiding problems such as deadlock, livelock and starvation.
The later part of the module will cover more advanced topics (higher-order functions) and look at alternative concurrency models (e.g. synchronous, channel-based, join-based and shared-memory) and their relationship to the model described in the first part of the module. Alongside this, consideration will be given to the relevance and applicability of functional and concurrent programming for use in real applications.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Scala, the fundamentals	1	3
Modern CPU architecture, deterministic dataflow	2	6
Asynchronous programming, Futures and Promises	1	3
Functional programming, task and data parallelism	1	3
Functional reactive programming, reactive streams	1	3

Message passing, Actors	2	6
Agents and other concurrent programming constructs	2	6
Memory models, shared-memory concurrency	1	3
Concurrent collections, atomicity	1	3
Concurrency patterns and pitfalls	1	3
Non-blocking algorithms, LMAX Disruptor case study	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Have a basic understanding of the concepts of functional programming: how evaluation operates, side-effect-free programming, the role of types and type definitions.	Lectures	Exam, Quizzes
1.2	Have a basic understanding of the concepts of concurrent programming: software	Lectures	Exams, Homework, Quizzes

	processes/threads, communication and synchronisation.		
1.3	Be able to use effectively functional and concurrent programming paradigms to design systems.	Lectures	Exam, Homework, Quizzes
1.4	Be able to implement functional and concurrent programs to solve specific problems using appropriate programming paradigms.	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate functional and concurrent programs	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate functional and concurrent programs using evaluation measures	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate real world concurrent 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 concurrent and functional languages	Project	Project Report, Project presentation
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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks xi. Aleksandar Prokopec, Learning Concurrent Programming in Scala, Packt Publishing, 2014 xii. Cay S. Horstmann, Scala for the Impatient, AddisonWesley, 2012 xiii. Brian Goetz, Java Concurrency in Practice, AddisonWesley, 2006 xiv. Maurice Herlihy, Nir Shavit, The Art of Multiprocessor Programming, Revised Reprint, Morgan Kaufmann, 2012
2. List Essential References Materials (Journals, Reports, etc.) vi. Recent Papers in functional and concurrent related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. v. erlang, F#, java 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.) ix. One classroom (25 seats) x. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) xiii. Whiteboard xiv. Internet connection xv. 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 v. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department ix. Course file of the course will be maintained and evaluated by some senior faculty member. x. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development v. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) ix. A random sample from the marked papers may be evaluated by an independent senior faculty member. x. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. ix. Department has curriculum committee that periodically review courses. x. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Mohamed K. Nour

Signature: *Mohamed K. Nour* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Mobile Application Development

Course Code: 14016334-3

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: Mobile Application Development
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Mohamed Nour
5. Level/year at which this course is offered: 1
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

The aim of this module is to combine the techniques learned in previous software development modules with the unique characteristics and rapidly changing aspects of mobile application production. Students will learn how to develop mobile apps that can take advantage of location-based services, sensor rich development environments and gesture-based interaction features. As the mobile software domain is still fast moving and evolving, we will emphasise techniques and methods that will remain applicable to the latest technology of the day. This course is intended to provide students with a comprehensive understanding of the tasks related to the development of enterprise-level mobile applications.

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:

More and more people are using increasingly powerful mobile devices as their primary means of obtaining information and requesting services over the Internet. The shift from traditional personal computers (desktops and laptops) to mobile devices (Smart phone and tablets), as a means of accessing services, has forced enterprises to adapt mobile channels for their existing applications. At the same time, demand for new kinds of applications that can exploit the unique characteristics of mobile devices is rapidly growing. While there certainly is value in developing a mobile app user interface for an existing business application, the users of mobile applications have come to expect more from their mobile experience. This has manifested in an ever-increasing demand for mobile application development in the market.
The topics to be covered will include the design, interface building, resource management and code elaboration aspects of these applications. The concepts learned by students will be applicable to any mobile operating system, but emphasis and practice on a specific platform will be achieved through the coursework.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**

Design Quality : - Why Mobile Apps? - Choice of Implementation Technology - Native Application Implementation - Mobile Web Applications - Hybrid Mobile Application Implementation	2	6
App Design Issues and Considerations - Mobile Development Lifecycle Overview - Form Factors and User Input Technology - Architecture, Design and Engineering Considerations - Usability and User Interaction Design - Mobile Navigation and Interface Design - Overarching Design Principles and Guidelines	2	6
Developing the Mobile App - Techniques, Methodologies for Mobile Application Development - Mobile Application Development Frameworks - Persistent Data in Mobile Apps - Maps and Location in Mobile Apps	3	9
iOS Navigation and interface Design Access to Hardware and Sensors - Building Mobile Apps Powered by Enterprise Backend - Secured Data Store and Synchronization	3	9
Testing and Publishing Apps - Mobile Application Build and Delivery - Testing Mobile Applications - Automated versus Manual Testing - App Distribution Through App Stores - App Distribution for the Enterprise - Monetizing Apps	3	12
iOS and Android - Publishing APP	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Knowledge and understanding of the capabilities and limitations of mobile platforms that affect application development and deployment	Lectures	Exam, Quizzes
1.2	Knowledge and understanding of the technology and business trends impacting mobile application development	Lectures	Exams, Homework, Quizzes
1.3	Knowledge and understanding of the characterisation and architecture of mobile applications	Lectures	Exam, Homework, Quizzes
1.4	Knowledge and understanding of the enterprise-scale requirements of mobile applications	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	Evaluate alternative mobile frameworks, and contrast different programming platforms	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Model and manage mobile application development using a range of methods	Lecture, Case studies,	Exams, Quizzes, Homework

2.3	Explain the advantages and limitations of development frameworks	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
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%
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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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks i. Jakob Iversen (2013). Learning Mobile App Development: A Hands-on Guide to Building Apps with iOS and Android. ii. Leigh Williamson et. al (2015). Enterprise Class Mobile Application Development: A Complete Lifecycle Approach for Producing Mobile Apps. iii. Sachin Date (2015). An Illustrated Guide to Mobile Technology.
2. List Essential References Materials (Journals, Reports, etc.) vii. Recent Papers in Mobile Application computing related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. vi. Java, Javascript 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.) xi. One classroom (25 seats) xii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) xvi. Whiteboard xvii. Internet connection xviii. 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 vi. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xi. Course file of the course will be maintained and evaluated by some senior faculty member. xii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development vi. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xi. A random sample from the marked papers may be evaluated by an independent senior faculty member. xii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xi. Department has curriculum committee that periodically review courses. xii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Mohamed K. Nour

Signature: *Mohamed K. Nour* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Service Oriented Architecture

Course Code: 14016335-3

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: Service Oriented Architecture 14016335-3		
2. Credit hours: 3		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Basem Alkazemi		
5. Level/year at which this course is offered: level 2 or 3		
6. Pre-requisites for this course (if any): 14016102-3		
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	percentage?	100
b. Blended (traditional and online)	percentage?	
c. E-learning	percentage?	
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of service oriented architecture build enterprise software systems.

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 coursework and prototypes.

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

Course Description:

There has been much recent interest in service-based architectures as a very promising means to structure software development. This represents a convergence of simple ideas from the world of objects with other concepts in distributed systems and component-based development, underpinned by cross-platform protocols based largely on XML. This course will describe the SOA architectural pattern and the underlying tools and techniques involved in developing a conforming system.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Software components	1	3
Web-services	2	6
Representational state transfer	1	3
Composition	1	3
Middleware	2	6
Software architecture	2	6
Semantic web	2	6
Service qualities	1	3
Engineering SOA	2	6

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

	Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total

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 software components	Lectures	Exam, Quizzes
1.2	Understand web services architecture	Lectures	Exams, Homework, Quizzes
1.3	Understand different Architectural styles of the web	Lectures	Exam, Homework, Quizzes
1.4	Identify current tools for SOA	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	Develop a middleware prototype	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate Service quality algorithms using evaluation measures	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate real world application exchange mechanisms using REST or SOAP	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 semantic web application	Project	Project Report, Project presentation
4.3	Demonstrate the ability to use formal and statistical techniques in the design and analysis of semantic web for Knowledge representation	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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks
xi. Service-Oriented Architecture: Analysis and Design for Services and Microservices (2nd Edition) (The Prentice Hall Service Technology Series from Thomas Erl) 2nd Edition,2016.
xii. Web Services, Service-Oriented Architectures, and Cloud Computing: The Savvy Manager's Guide (The Savvy Manager's Guides) 2nd Edition,2013.
2. List Essential References Materials (Journals, Reports, etc.)
viii. Recent Papers in SOA related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
vii. Java or Object-oriented programming, UML.

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.)
xiii. One classroom (25 seats)
xiv. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xix. Whiteboard
xx. Internet connection
xxi. 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 vii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xiii. Course file of the course will be maintained and evaluated by some senior faculty member. xiv. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development vii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xiii. A random sample from the marked papers may be evaluated by an independent senior faculty member. xiv. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xiii. Department has curriculum committee that periodically review courses. xiv. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Basem Alkazemi

Signature: *Basem Alkazemi* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Simulation Modelling for Computer Science

Course Code: 14016336-3

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: Simulation Modelling for Computer Science
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Mohamed K. Nour
5. Level/year at which this course is offered: 1
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

The module aims to introduce you to scientific modelling, give a survey over various modelling paradigms and equip you with basic analytical and numerical tools to build (simulation) models.

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:

Simulation modelling plays an increasingly significant role across modern science and engineering, with the development of computational models becoming established practice in industry, consulting, and policy formulation. Computer scientists are often employed as modellers or software engineers to help in the model development & maintenance cycle. Therefore this is a current and future need for computer science graduates to have a grounding in both the philosophy of modelling in science and various modelling techniques.

This module will familiarize students with general knowledge about the role of modelling in science (with a particular emphasis on computational modelling), will discuss the process of model development and best practice in various stages in the model development cycle. A second (and larger) part of the module will provide a broad survey of the central modelling paradigms.

Throughout the module we will demonstrate how computer science techniques are used to develop models in the following domains:

- Information networks
- Design and management of infrastructure
- Epidemics
- Natural resource management
- Computational economics
- Collective robotics
- Online trading systems
- Climate and Earth system

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Simulation Basics	2	6
Dynamical, Finite State, and Complex Model Simulations	3	9
Systems dynamics	3	9
Agent Based Models	2	6
Converting to Parallel and Distributed Simulations	1	3
Probability and Statistics for Simulations and Analysis	1	3
Simulations Results Analysis and Viewing Tools	1	3
Monte Carlo methods	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Recognise the main elements of scientific methods - what is a model, what is a computational model?	Lectures	Exam, Quizzes
1.2	Detail the role of a computer science in the development of scientific models	Lectures	Exams, Homework, Quizzes
2.0	**Cognitive Skills**		
2.1	Discriminate between different modelling approaches and evaluate their pros and cons	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate and present the output of a computational model	Lecture, Case studies,	Exams, Quizzes, Homework
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 simulation application	Project	Project Report, Project presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of simulation models	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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks
xiii. Banks, J., J.S. Carson, B.L. Nelson, and D.M. Nicol (2005), Discrete-Event System Simulation, Fourth Edition, Prentice-Hall, Upper Saddle River, NJ.
xiv. Law, Modeling and Simulation, 2006
xv. Excel Data Analysis: Modeling and Simulation, 2019
xvi. Cantot, P., and Luzeaux, D., Eds. (2013), *Simulation and Modeling of Systems of Systems*. John Wiley and Sons.
2. List Essential References Materials (Journals, Reports, etc.)
ix. Recent Papers in simulation and modeling related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
viii. 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.)
xv. One classroom (25 seats)
xvi. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xxii. Whiteboard
xxiii. Internet connection
xxiv. 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 viii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xv. Course file of the course will be maintained and evaluated by some senior faculty member. xvi. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development viii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xv. A random sample from the marked papers may be evaluated by an independent senior faculty member. xvi. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xv. Department has curriculum committee that periodically review courses. xvi. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Mohamed K. Nour

Signature: *Mohamed K. Nour* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Software Architecture

Course Code: 14016337-3

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: Software Architecture			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Mohamed Nour			
5. Level/year at which this course is offered: 1			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

This course introduces the essential concepts of software architecture. A software architecture is an abstract view of a software system distinct from the details of implementation, algorithms, and data representation. Architecture is, increasingly, a crucial part of a software organization's business strategy. Software architectures can

- provide flexibility and adaptability in changing markets
- allow for interoperability with other players in the marketplace
- provide leverage of control in a marketplace
- help developers focus on a niche in the marketplace
- be used as a sales and marketing tool
- help reduce maintenance costs and amortize development costs
- assist in workforce organization and with project oversight and control
- establish a common corporate vocabulary
- shorten learning time

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:

After completing this course in entirety, learners will have a better understanding of

- what is a software architecture
- why a software architecture is important
- the architecture influence cycle
- the relationships between system qualities and software architectures
- software architectural patterns and tactics, and their relationship to system qualities
- attribute-driven design
- software architecture documentation
- software architecture evaluation
- architectural reuse via software product lines
- architectures in Agile projects

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
definition and overview of software architecture	2	6
the architecture business cycle: what influences software architects and software architecture	2	6
understanding and achieving quality attributes	2	6
architecture design using patterns and tactics	2	6
documenting software architecture	2	6
evaluating software architecture	2	6
architecture reuse via product lines	1	3
architecture in Agile projects	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	**Tutorial**	**Laboratory/ Studio**	**Practical**	**Other**	**Total**
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 basic techniques of software architecture	Lectures	Exam, Quizzes
1.2	Understand design patterns	Lectures	Exams, Homework, Quizzes
1.3	Understand different architecture styles and framework	Lectures	Exam, Homework, Quizzes
1.4	Identify most adequate design to a problem based on archiecture	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate software architecture	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate software architecture using architecture evaluation measures	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate real world software system	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 software architecture application	Project	Project Report, Project presentation
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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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)
xxi. Office Hours for student counseling and support – Three hours/week
xxii. Availability of teaching Staff on e-learning resources.

E Learning Resources

1. List Required Textbooks
xvii. Software Architecture in Practice, 3rd Edition, By Len Bass, Paul Clements, Rick Kazman, Published Sep 25, 2012 by Addison-Wesley Professional. Part of the SEI Series in Software Engineering series.
2. List Essential References Materials (Journals, Reports, etc.)
x. Recent Papers in Software Architecture related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
ix. N/A

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.)
xvii. One classroom (25 seats)
xviii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xxv. Whiteboard
xxvi. Internet connection
xvii. 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

ix. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xvii. Course file of the course will be maintained and evaluated by some senior faculty member. xviii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development ix. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xvii. A random sample from the marked papers may be evaluated by an independent senior faculty member. xviii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xvii. Department has curriculum committee that periodically review courses. xviii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Mohamed Nour

Signature: *Mohamed Nour* **Date Completed:** March. 15, 2019

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Software Project Management and Development

Course Code: 14016338-3

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: Software Project Management and Development		
2. Credit hours: 3		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Mohamed K Nour		
5. Level/year at which this course is offered: 1		
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		percentage? 100
b. Blended (traditional and online)		percentage?
c. E-learning		percentage?
d. Correspondence		percentage?
f. Other		percentage?
Comments:		

B Objectives

1. The main objective of this course

The aim of this module is to prepare students for undertaking large software projects.

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:

The course introduces the students to the high-level strategies required for managing projects from their genesis to completion.
This includes decision making regarding the overall project strategy, staffing levels, development environment, etc. The module also aims to expose the students to modern development techniques such as XP and Scrum and Test-Driven Development. Experience of Object-Oriented programming is assumed..

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Managing the software development process:	1	3
Estimating software projects Contracts,	1	3
planning and monitoring	1	3
Costing and budgeting Models of Software Projects	1	3
Quality assurance: Concepts in QA Capability Maturity Modelling	1	3

ISO 9000 standards	1	3
Metrics	2	6
Testing strategies	2	6
Risk management	1	3
Development methods: Iterative and incremental development	1	3
Agile Development techniques	1	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Formal management for software projects	Lectures, project	Exam, Quizzes

1.2	Quality assurance practices for software projects	Lectures,project	Exams, Homework, Quizzes
2.0	**Cognitive Skills**		
2.1	Design and implement software projects	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate software projects	Lecture, Case studies,	Exams, Quizzes, Homework
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 Software Engineering	Project	Project Report, Project presentation
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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks
xviii. Managing successful projects with PRINCE2, 2017, ISSN: 9780113315338
xix. Effective Project Management: Traditional, Agile, Extreme, Robert K. Wysocki 7th Edition, ISSN: 9781118179758
xx. K. Schwibe. IT Project Management.
xxi. Ian Sommerville. Software Engineering.
xxii. Roger S. Pressman. Software Engineering: A Practitioner's Approach.
2. List Essential References Materials (Journals, Reports, etc.)
xi. Recent Papers in Software Project Management related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
x. 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.)
xix. One classroom (25 seats)
xx. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xviii. Whiteboard
xxix. Internet connection
xxx. 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 x. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xix. Course file of the course will be maintained and evaluated by some senior faculty member. xx. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development x. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xix. A random sample from the marked papers may be evaluated by an independent senior faculty member. xx. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xix. Department has curriculum committee that periodically review courses. xx. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Mohamed K. Nour

Signature: *Mohamed K. Nour* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Software Testing

Course Code: 14016339-3

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: Software Testing 14016339-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Mohamed K. Nour			
5. Level/year at which this course is offered: level 3 or 4			
6. Pre-requisites for this course (if any): 14016101-3			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

At the end of the course, students will have an appreciation of a range of testing techniques, and an understanding of rigorous testing theory. They will be able to select an appropriate testing strategy, devise suitable test cases, and formulate correctness hypotheses.

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:

The main focus of this course is on realistic, pragmatic steps for rigorous and organized software testing. It clarifies testing terminology and covers the different types of testing performed at each phase of the software lifecycle together with the issues involved in these types of testing. The course will discuss how tests can be derived from requirements and specifications, design artifacts, or the source code, and introduce proper testing tools that will be used in a number of ad-hoc exercises..

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introduction: attitude adjustment; testing in context; basic terminology; types of testing; testing in the development life-cycle; general testing principles.	2	6
Black Box Testing static black box testing; equivalence class partitioning boundary values analysis; combinatorial models: decision tables, cause-and-effect graphs, test generation heuristics; binary decision trees; state transition graphs.	3	9

White Box Testing static white box testing: formal reviews and inspections; programs as directed graphs; control-flow analysis and cyclomatic complexity; data-flow analysis, test data, and assignment-use graphs; program slicing; mutation testing.	3	9
Levels of Testing unit testing (JUnit); integration testing; system testing; performance, stress, and configuration testing; regression testing; acceptance testing	3	9
Object-oriented testing problems specific to OO testing adapting classic testing techniques to OO.	2	6
Test Tools and Automation	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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 software testing	Lectures	Exam, Quizzes

1.2	Understand black box and white box testing	Lectures	Exams, Homework, Quizzes
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate testing methods	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate software using testing methods	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate test cases for real world 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 testing software	Project	Project Report, Project presentation
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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks
xxiii. [Glenford, Myers & Badgett 11] Glenford J. Myers; Corey Sandler; Tom Badgett; "*The Art of Software Testing*", 3rd Edition; John Wiley & Sons;2011.
xxiv. [Ammann&Offutt08] Paul Ammann; Jeff Offutt, *"Introduction to Software Testing*"; Cambridge University Press,2008
xxv. [Black16] Rex Black; "*Advanced Software Testing - Vol. 1*", 2nd Edition; Rocky Nook;2016
xxvi. [Brian15] Brian; Peter; Angelina; Geoff; Peter "*Software Testing - An ISTQB-BCS Certified Tester Foundation guide"* 3rd edition; BCS Learning & Development Limited; 2015
xxvii. [Bath08] Graham Bath, Judy McKay, "The Software Test Engineer's Handbook", Rocky Nook, 2008
xxviii. [Vance,13] Stephen Vance; "*Quality Code: Software Testing Principles, Practices, and Patterns"*; Addison-Wesley Professional; 2013
2. List Essential References Materials (Journals, Reports, etc.)
xii. Recent Papers in Software Testing related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
xi. Java or similar language

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.)
xxi. One classroom (25 seats)
xxii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xxxi. Whiteboard
xxii. Internet connection
xxiii. 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 xi. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xxi. Course file of the course will be maintained and evaluated by some senior faculty member. xxii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development xi. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xxi. A random sample from the marked papers may be evaluated by an independent senior faculty member. xxii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xxi. Department has curriculum committee that periodically review courses. xxii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Mohamed K. Nour

Signature: *Mohamed K. Nour* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Web Application Development

Course Code: 14016431-3

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: Web Application Development 14016431-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (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: level 2 or 3
6. Pre-requisites for this course (if any): 14016101-3
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

To provide an overview of web development techniques

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:

To provide students with the opportunity to improve their understanding of web development, and their judgement of the effectiveness of different development techniques, both in theory and in practice.
To cover important techniques and issues in designing and building large scale web systems.

To consider development methods and patterns which enhance maintainabilty and testability, such as web components, MVC, ORM, and HTML template engines.

To familiarise students with relevant web development frameworks such as ASP.NET, and compare this with alternatives such as Object-Oriented PHP, Enterprise Java, and server-side JavaScript.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Review of modern web standards such as HTML5 and CSS3 - web templates and template engines - responsive web design	1	3
Web Information Architecture and Content Management Systems - intranet search techniques, use of metadata - examples of CMS/Portals such as Sharepoint and Drupal	2	6

Web Development using ASP.NET - underlying .NET technologies such as C#, ASP, and LINQ - ASP.NET web pages and web forms - ASP.NET Razor and MVC - comparison with other approaches to Web Development - comparison of client-side versus server-side programming	5	15
Patterns and methods to enhance maintainability and testability - dependability injection and inversion of control - Model-View-Controller (MVC) and variants (MV*) - object relational mapping (ORM)	2	6
Business Logic - maintaining web state (page, session, and application lifetime and scope) - persistence using Entity Framework and LINQ - techniques for validating input data in each tier and their benefits	2	6
Testing, deployment and configuration - classification and management of detected errors - range and use of web test automation tools - web site hosting	2	6
Performance modelling and management - partitioning and parallelism, Amdahl's law - performance modelling and benchmarking - graceful degradation (admission control, disabling recommendations)	2	6

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Modern web standards, content management systems, and responsive web design	Lectures	Exam, Quizzes
1.2	The ASP.NET web development framework, including web controls, web parts, web forms and MVC	Lectures	Exams, Homework, Quizzes
1.3	Similarities and differences with alternatives such as Enterprise Java, OO PHP, and Python/Django	Lectures	Exam, Homework, Quizzes
1.4	Techniques for deploying and testing web sites, and for enhancing their performance and scalability	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		

2.1	Evaluate alternative server-side frameworks, client-side and server-side web programming	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Model and manage web performance using a range of methods	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Explain the limitations of partitioning and parallelism in improving web performance	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	Design and build ASP.NET web sites using professional web development tools such as IDEs, HTML template engines, test automation, and Object-Relational Mapping software	Project	Project Report, Project presentation
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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks i. Adam Freeman (2013). Pro ASP.NET MVC 4. ii. Imar Spaanjaars (2012). Beginning ASP.NET in C# and VB. iii. Cal Henderson (2006). Building Scalable Web Sites.
2. List Essential References Materials (Journals, Reports, etc.)
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. Visual studio and .Net frameworks

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.) xxiii. One classroom (25 seats) xxiv. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) xxiv. Whiteboard xxv. Internet connection xxvi. 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

xii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xxiii. Course file of the course will be maintained and evaluated by some senior faculty member. xxiv. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development xii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xxiii. A random sample from the marked papers may be evaluated by an independent senior faculty member. xxiv. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xxiii. Department has curriculum committee that periodically review courses. xxiv. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Mohamed K. Nour

Signature: *Mohamed K. Nour* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advanced Topics in Software Engineering

Course Code: 14016432-3

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: Advanced Topics in Software Engineering 14016432-3		
2. Credit hours: 3		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Sultan Almotiri		
5. Level/year at which this course is offered: level 3/ year 2		
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	percentage?	100
b. Blended (traditional and online)	percentage?	
c. E-learning	percentage?	
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course

Advanced topics selected from current literature that deals with field of Software Engineering which is not been covered by other regular and elective courses. The specific content of an offering of the course should focus on a specific area of Software Engineering.

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:

The course will teach state of the art theoretical and practical knowledge in the field of Data Science. Students will be assigned assignments and project to get hands on experience. At the end of the course, a seminar/presentation event will take place in which students will present their course projects/research work.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
TBA (To Be Announced)	1-14	42

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	An ability to recognize the use of Cloud Computing in solving real life problems (e.g., cloud as service, cloud as storage)	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	An ability to identify current techniques, skills, and tools necessary for the development of programming and software engineering	Lecture, Group discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate system, process, component, or program on Cloud	Lecture, Project	Exam, HWs
2.2	Investigate real world problems in the context of software engineering and design innovative solutions	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation
3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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	Use of latest development tools	Lecture, Project	Project Report, Project presentation

4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of algorithms.	Lecture, Case studies, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for computing system	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	HW 1	2	5%
2	Quiz 1	3	5%
3	HW 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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. Decided by the teacher
2. List Essential References Materials (Journals, Reports, etc.) i. Recent Papers in Software Engineering Research
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. i. Springer Journal of Software Engineering ii. IEEE Transactions on Software Engineering
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. i.

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
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 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.

2. Other Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan Almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Cryptography Fundamentals

Course Code: 14016321-3

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: Cryptography Fundamentals 14016321-3		
2. Credit hours: 3		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Khaled Tarmissi		
5. Level/year at which this course is offered: level 2 or 3		
6. Pre-requisites for this course (if any): 14016103-3		
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	percentage?	100
b. Blended (traditional and online)	percentage?	
c. E-learning	percentage?	
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course

Upon successful completion of this course, students will have knowledge and understanding of: Classical encryption techniques, Block ciphers and the Data Encryption Standard, Basics of finite fields, Advanced Encryption Standard, Contemporary symmetric ciphers, Confidentiality using symmetric encryption, Basics of number theory, Key management, Public key cryptosystems, Message authentication, Hash functions and algorithms, Digital signatures and authentication protocols.

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:

This course provides students with a thorough review of cryptography and cryptographic techniques as they apply to the area of information and computer security. Students will learn about various cryptography techniques along with their advantages and disadvantages. Additionally, discussion will be provided on the various systems that are used to provide secure and encrypted end-to-end communications to include: pre-shared keys, hashing algorithms, certificates, public-key/private key infrastructures and shared secret keys.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
1. Introduction and Overview	1	3
2. Traditional Symmetric Key Ciphers and Classical Cryptography	2	6
3. Mathematics of Cryptography	1	3
4. Introduction to Modern Symmetric-Key Ciphers	1	3
5. Stream cipher	1	3
6. Block cipher	1	3
7. Asymmetric Key Cryptography	2	6

8. RSA cryptosystem	1	3
9. Other public key cryptosystem	1	3
10. Cryptographic Hash Functions	1	3
11. Digital Signature	1	3
12. Key management distribution	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Students will be aware of, and be able to identify the concept of cryptography and computer security.	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Understand basics of different cipher algorithm types	Lecture, Group discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		

2.1	describe the different services that cryptography provides and give examples of cryptographic mechanisms that provide a given service.	Lecture, Project	Exam, HWs
2.2	describe the different attack models covered in the course and how they relate to each other.	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	restate the main cryptographic protocols that are covered in the course and their different functions.	Group discussion, Project	Project Report, Project presentation
3.2			
4.0	**Communication, Information Technology, Numerical**		
4.1	Learn fundamental concepts in mathematics of cryptography.	Lecture, Group discussion, Project	Exam, HWs, Quizzes
4.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Project Report, Project presentation	Reports
5.0	**Psychomotor (if any)**		
5.1			

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	Assignment 1	2	5%
2	Quiz 1	3	5%
3	Assignment 2	5	5%
4	Quiz 2	6	5%
5	Assignment 3	7	5%
6	Midterm Exam	9	20%
7	Project	10	15%
8	Final Exam	15	40%

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) iii. Office Hours for student counseling and support – Three hours/week iv. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks iii. William Stallings, Cryptography and network security, sixth edition, Pearson Education ISBN-13: 978-0133354690
2. List Essential References Materials (Journals, Reports, etc.) **v.** Jonathan Katz and Yehuda Lindell. **Introduction to Modern. Cryptography,** 2nd edition, ISBN13 9781466570269 vi.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. ii.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. ii.

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.) iii. One classroom (25 seats) iv. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) iii. Whiteboard iv. Internet connection v. Smart Board
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

iii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department iii. Course file of the course will be maintained and evaluated by some senior faculty member. iv. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development ii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) iii. A random sample from the marked papers may be evaluated by an independent senior faculty member. iv. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. iii. Department has curriculum committee that periodically review courses. iv. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Khaled Tarmissi

Signature: *Khaled Tarmissi* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Cyber Defense in Web-Based Attacks

Course Code: 14016322-3

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: Cyber Defense in Web-Based Attacks 14016322-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Sultan Almotiri			
5. Level/year at which this course is offered: 3 or 4 /2			
6. Pre-requisites for this course (if any): 14016103-3			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

This course provides students with threats in web-based resources and how the course will site the common threats and vulnerabilities

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:

This course includes a focus on external cyber security threats including the Internet, information n etworks and the WorldWide Web. There will be a detailed view into social media, search engines, a nd current trends that integrate social media outlets into the enterprise as a means of achieving stra tegic objectives. This course prepares students to protect web-based resources, sites and portals for common threats and vulnerabilities. Risk mitigation and SQL injection prevention techniques

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Evolution of World Wide Web and E-commerce	1	3
Security Considerations for Internet based Businesses	1	3
Internet Security Considerations for Enterprise Architectures	1	3
Web Hosting – Risks, Threats, and Vulnerabilities	1	3
Mitigating Common Vulnerabilities and Attacks Impacting Enterprise Web Applications	2	6
Web Application Security Consortium	1	3
Understanding the Secure Software Development Life Cycle	1	3

What makes Web Applications Vulnerable? Causes and Best Practices	1	3
Vulnerabilities in Credit Card Transaction Processing – PCI Standards & Auditing	2	6
Managing Production-level Web Sites	2	6
Securing the WWW – Global Organizations and Their Role	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Describe best practices for securely connecting to the Internet.	Lecture, discussion	Exams, HWs, Quizzes
1.2	Compare and contrast Web-based risks.	Lecture, discussion	Exam, HWs, Quizzes

1.3	Describe the attributes and qualities of secure coding practices.	Lecture, discussion	Exam, HWs, Quizzes
1.4	Describe popular endpoint communications devices and their security risks.	Lecture, discussion	Exams, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Analyze common Web site attacks, vulnerabilities, and security best practices.	Lecture, Project	Exam, HWs
2.2	Analyze the role and importance of quality assurance (QA) testing for Web applications.	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	Evaluate the role and importance of auditing and compliance as it relates Web application security.	Group discussion, Project	Project Report, Project presentation
3.2	Explain the value and importance of vulnerability and security assessments for Web applications.	Group discussion, Project	Project Report, Project 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
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for implementation of algorithms on various platforms	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	Assignment 1	2	5%
2	Quiz 1	3	5%
3	Assignment 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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) v. Office Hours for student counseling and support – Three hours/week vi. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks iv. Harwood, M. (2016). Internet Security: How to Defend Against Attackers on the Web (2nd ed.). Burlington, MA: Jones & Bartlett Learning. ISBN-13: 9781284090550
2. List Essential References Materials (Journals, Reports, etc.) vii.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. iii.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. iii.

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.) v. One classroom (25 seats) vi. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) vi. Whiteboard vii. Internet connection viii. Smart Board
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 iv. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department

v. Course file of the course will be maintained and evaluated by some senior faculty member. vi. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development iii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) v. A random sample from the marked papers may be evaluated by an independent senior faculty member. vi. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. v. Department has curriculum committee that periodically review courses. vi. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan H. almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Cyber Security and Digital Crime

Course Code: 14016323-3

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: Cyber Security and Digital Crime 14016323-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Sultan Almotiri			
5. Level/year at which this course is offered: Level 2 or 3			
6. Pre-requisites for this course (if any): 14016103-3			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

Cyber security and digital crime will provide the students the information about security threats. This course provides you with an introduction to cyber security and digital crime. You will learn about information security threats, dangers, and risks that organizations face in the workplace. You'll also gain the ability to analyze potential vulnerabilities that can have an adverse impact on digital assets.

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:

The topics include system security objectives and threats, user authentication, access control, database and cloud security, denial of service, IDS, IPS, computer security models, IT security management and risk assessment, enterprise architecture security threats and preventions, security Awareness and security polices, digital crime, cybercrime.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
System Security Objectives and Threats	1	3
User Authentication and Potential Threats	1	3
Access Control and Identity Management	1	3
Database and Cloud Security	1	3
System Malware Types and Operations	1	3
Denial of Service	1	3
Intrusion Detection Strategies	1	3
Intrusion Prevention Strategies	1	3
Computer Security Models	1	3
IT Security Management and Risk Assessment	2	6

Enterprise Architecture Security Threats, Prevention, and Recovery	1	3
Security Awareness, Policies, and Digital Crime	1	3
Cyber Crime: Legal and Ethical Aspects	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Demonstrate the ability to differentiate between various types of systems security threats that can lead to the loss of a major system security goal	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Demonstrate understanding of security vulnerabilities and loss effects and consequences that can have adverse impact on digital assets	Lecture, Group discussion	Exam, HWs, Quizzes
1.3	Define and discuss types of computer crime, intellectual property, and codes of ethics in Information technology professions.	Lecture, Group discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		

2.1	Analyze enterprise security needs and provide recommendations to best suit enterprise technology infrastructure.	Lecture, Project	Exam, HWs
2.2	Analyze potential enterprise security vulnerabilities at various business sectors	Lecture, Case studies,	Exams, Reports
2.3	Apply various security models and measures to enterprise infrastructure.	Lecture, Project	Project Report, Project presentation
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate comparative understanding of benefits gained from applying various security measures to enterprise infrastructure.	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation
3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for implementation of algorithms on various platforms	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	Assignment 1	2	5%
2	Quiz 1	3	5%
3	Assignment 2	5	5%
4	Quiz 2	6	5%
5	Assignment 3	7	5%
6	Midterm Exam	9	20%
7	Project	10	15%
8	Final Exam	15	40%

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) vii. Office Hours for student counseling and support – Three hours/week viii. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks v. Stallings, W., & Brown L. (2018). Computer Security: Principles and Practice. Upper Saddle River, NJ: Pearson Education, Inc. ISBN-13: 9780134794105
2. List Essential References Materials (Journals, Reports, etc.) viii. ix.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. iv.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. iv.

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.) vii. One classroom (25 seats) viii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) ix. Whiteboard x. Internet connection xi. Smart Board
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

v. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department vii. Course file of the course will be maintained and evaluated by some senior faculty member. viii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development iv. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) vii. A random sample from the marked papers may be evaluated by an independent senior faculty member. viii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. vii. Department has curriculum committee that periodically review courses. viii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan H. almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Digital Forensics and Investigations

Course Code: 14016324-3

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: Digital Forensics and Investigations 14016324-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Khaled Tarmissi			
5. Level/year at which this course is offered: level 2 or 3			
6. Pre-requisites for this course (if any): 14016103-3			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

Upon successful completion of this course, students will be able to:

1. Summarize the basic principles of computer forensics.
2. Summarize important laws regarding computer forensics.
3. Describe various computer crimes and how they are investigated.
4. Describe digital forensic methodology and labs.
5. Outline the proper approach to collecting, seizing, and protecting evidence.
6. Explain techniques for hiding and scrambling information as well as how data is recovered.
7. Summarize various types of digital forensics.
8. Explain how to perform a network analysis.
9. Describe incident and intrusion response.
10. Identify trends in and resources for digital forensics.
11. Demonstrate the ability to secure digital assets using with best practices, appropriate laws, and relevant regulations related to digital investigations.
12. Demonstrate the ability to apply knowledge of the management of digital investigations, which may include but is not limited to collection, storage, cataloging evidence for use in prosecution of a digital crime scene.
13. Demonstrate the ability to identity and respond to cyber security attacks with preservation of the crime scene.

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:

This course provides students with insight to system forensics investigation and response. Areas of study include procedures for investigating computer and cybercrime, and concepts for collecting, analyzing, recovering, and preserving forensic evidence. Students will learn how to respond to cyber breaches, including the recovery, preservation, analysis of digital evidence, and proper incident response. In addition to the tools of the digital forensics trade, students will become familiar with relevant federal statutes. They will be presented with various scenarios a digital forensics investigator may face and be asked how they would react

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
1: Introduction to Digital Forensics and Investigations	1	3
2: Overview of Computer Crime	1	3
3: Forensic Methods and Labs	1	3
4: Collecting, Seizing, and Protecting Evidence	1	3
5: Understanding Techniques for Hiding and Scrambling Information	1	3
6: Recovering Data	1	3
7: Email Forensics	1	3
8: Windows Forensics	1	3
9: Linux Forensics	1	3
10: Macintosh Forensics	1	3
11: Mobile Forensics	1	3
12: Performing Network Analysis	1	3
13: Incident and Intrusion Response	1	3
14: Trends and Future Directions	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	**Tutorial**	**Laboratory/ Studio**	**Practical**	**Other**	**Total**
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	Summarize the basic principles of computer forensics.	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Summarize important laws regarding computer forensics.	Lecture, Group discussion	Exam, HWs, Quizzes
1.3			
2.0	**Cognitive Skills**		
2.1	Describe various computer crimes and how they are investigated.	Lecture, Project	Exam, HWs
2.2	Describe digital forensic methodology and labs.	Lecture, Case studies.	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	Explain techniques for hiding and scrambling information as well as how data is recovered.	Lecture, Group discussion, Project, Case studies	Project Report, Project presentation
3.2	Describe incident and intrusion response.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Identify trends in and resources for digital forensics.	Lecture, Group discussion, Project	Exam, HWs, Quizzes
4.2	Demonstrate the ability to secure digital assets using with best practices, appropriate laws, and	Lecture, Project Report, Project	Exams, HWs, Reports

	relevant regulations related to digital investigations.	presentation, Case studies	
4.3	Demonstrate the ability to apply knowledge of the management of digital investigations, which may include but is not limited to collection, storage, and cataloging evidence for use in prosecution of a digital crime scene	Lecture, Group discussion, Project, Case studies	Exams, HWs, Quizzes
5.0	**Psychomotor (if any)**		
5.1			

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	Assignment 1	2	5%
2	Quiz 1	3	5%
3	Assignment 2	5	5%
4	Quiz 2	6	5%
5	Assignment 3	7	5%
6	Midterm Exam	9	20%
7	Project	10	15%
8	Final Exam	15	40%

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) ix. Office Hours for student counseling and support – Three hours/week x. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks vi. System Forensics, Investigation, and Response, Second Edition, Chuck Easttom: ISBN-13: 978-1-284-03105
2. List Essential References Materials (Journals, Reports, etc.) x. Darren R. Hayes. **A Practical Guide to Computer Forensics Investigations,** 2nd edition, 2019, ISBN-13: 9780789759917 xi.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. v.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. v.

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.) ix. One classroom (25 seats) x. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) xii. Whiteboard xiii. Internet connection xiv. Smart Board
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

vi. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department ix. Course file of the course will be maintained and evaluated by some senior faculty member. x. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development v. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) ix. A random sample from the marked papers may be evaluated by an independent senior faculty member. x. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. ix. Department has curriculum committee that periodically review courses. x. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Khaled Tarmissi

Signature: *Khaled Tarmissi* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Ethical Hacking and Penetration Testing

Course Code: 14016325-3

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: Ethical Hacking and Penetration Testing 14016325-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Sultan Almotiri			
5. Level/year at which this course is offered: Level 2 or 3			
6. Pre-requisites for this course (if any): 14016103-3			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

This course provides students with the knowledge and practice needed to secure information systems against attacks such as viruses, worms, and other system weaknesses that pose significant danger to organizational data. Ethical hacking and penetration testing are applied to uncover common techniques used by cyber criminals to exploit system vulnerabilities.

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)

Describe and analyze the differences between ethical and unethical penetration testing. Describe and explain the phases of a penetration test. Applying different tools and methods to conduct penetration tests. Compare various methods of conducting network reconnaissance in penetration testing. Describe the role and purpose of network scanning in penetration testing. Applying different tools and methods to exploit systems during penetration testing. Describe and utilize methods and tools to maintain access to systems during penetration testing. Analyze and apply methods to report the results of penetration testing and make system recommendations.

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

Course Description:

The topics include introduction of hacking and the current state of hacking. Identifying fundamentals of TCP/IP concepts and technologies related to networking. Providing to the students the basic equipment controls, physical area control and facility controls. Show how to analyze port scanning and fingerprinting which used by the hackers.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introduction to Computer Hacking	1	3
Computer Hacking Concepts	1	3
Network Reconnaissance	1	3
Foot-printing	1	3
Systems Reconnaissance	1	3
System Enumeration	1	3
Wireless Security	1	3

Web-Based Attacks	1	3
System Malware Threats	1	3
System Access	2	6
Securing System Access and Sessions	1	3
Elements of Social Engineering and IT Security Incident Response	1	3
Defending and protecting IT Systems	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Describe common hacking techniques	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Describe common hacking methodologies	Lecture, Group discussion	Exam, HWs, Quizzes

1.3	Describe cryptography in the context of computer security	Lecture, Group discussion	Exam, HWs, Quizzes
1.4	Describe common methods used to exploit insecure applications	Lecture, Group discussion	Exams, HWs, Quizzes
1.5	Describe common threats to wireless LANs	Lecture, Group discussion	Exams, HWs, Quizzes
1.6	Describe how denial of service (DoS) attacks work	Lecture, Group discussion	Exams, HWs, Quizzes
1.7	Describe how social engineering attacks take place	Lecture, Group discussion	Exams, HWs, Quizzes
1.8	Describe the various steps in the incident response process.	Lecture, Group discussion	Exams, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Explain the history and current state of hacking and penetration testing, including ethical and legal implications	Lecture, Project	Exam, HWs
2.2	Recognize protocols that run at various levels of the OSI Reference Model	Lecture, Case studies,	Exams, Reports
2.3	Compare asymmetric and symmetric encryption techniques	Lecture, Project	Project Report, Project presentation
2.4	Explain common network mapping techniques	Lecture, Project	Project Report, Project presentation
2.5	Explain the role of password cracking in the context of penetration testing.	Lecture, Project	Project Report, Project presentation
2.6	Compare different forms of malware infections	Lecture, Project	Exam, HWs
2.7	Explain the role of different Linux security tools	Lecture, Project	Exam, HWs
2.8	Compare social engineering and phishing scams	Lecture, Project	Exam, HWs
3.0	**Interpersonal Skills & Responsibility**		
3.1	Analyze fundamental TCP/IP concepts and technologies related to networking.	Group discussion, Project	Project Report, Project presentation
3.2	Analyze the elements of physical security	Group discussion, Project	Project Report, Project presentation

3.3	Analyze how port scanning and fingerprinting are used by hackers	Lectures, discussion	Anti-plagiarism software, paper review, presentation
3.4	Analyze how enumeration is used in conjunction with system hacking		Project Report, Project presentation
3.5	Use anti-virus and anti-malware tools to identify system viruses and malware		Project Report, Project presentation
3.6	Analyze systems using Linux tools		Project Report, Project presentation
4.0	**Communication, Information Technology, Numerical**		
4.1	Illustrate the key steps in penetration testing	Project	Project Report, Project presentation
4.2	Assess common threats to physical security	Lecture, Project	Project Report, Project presentation
4.3	Assess common information-gathering tools and techniques	Lecture, Project	Exams, Project Report, Project presentation
4.4	Demonstrate Web and database attacks	Lecture, Project	Exams, Project Report, Project presentation
4.5	Assess and remove common types of malware from infected systems	Lecture, Project	Exams, Project Report, Project presentation
4.6	Demonstrate network traffic analysis and sniffing using appropriate tools	Lecture, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for implementation of algorithms on various platforms	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	Assignment 1	2	5%
2	Quiz 1	3	5%
3	Assignment 2	5	5%
4	Quiz 2	6	5%
5	Assignment 3	7	5%

6	Midterm Exam	9	20%
7	Project	10	15%
8	Final Exam	15	40%

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)
xi. Office Hours for student counseling and support – Three hours/week
xii. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks
i. Oriyano, S. P. (2018). *Hacker techniques, tools, and incident handling* (2nd ed.). Burlington, MA: Jones & Bartlett Learning. ISBN: 1284176843
2. List Essential References Materials (Journals, Reports, etc.)
i. Bowles, M. (2012). The Business of Hacking and Birth of an Industry. Bell Labs Technical Journal, 17(3), 5-16.
ii. Farsole, A. A., Kashikar, A. G., & Zunzunwala, A. (2010). Ethical hacking. International Journal of Computer Applications (IJCA), 1(10), 14-20. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.184.6791&rep=rep1&type=pdf
iii. Dimkov, T., Van Cleeff, A., Pieters, W., & Hartel, P. (2010, December). Two methodologies for physical penetration testing using social engineering. *Proceedings of the 26th annual computer security applications conference*. New York, NY: ACM. Retrieved from http://eprints.eemcs.utwente.nl/18719/01/157.pdf
iv.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
vi.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
vi.

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.)
xi. One classroom (25 seats)
xii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)

xv. Whiteboard xvi. Internet connection xvii. Smart Board
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 vii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xi. Course file of the course will be maintained and evaluated by some senior faculty member. xii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development vi. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xi. A random sample from the marked papers may be evaluated by an independent senior faculty member. xii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xi. Department has curriculum committee that periodically review courses. xii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan H. almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Mobile Security

Course Code: 14016326-3

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: Mobile Security 14016326-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Sultan Almotiri
5. Level/year at which this course is offered: Level 2 or 3
6. Pre-requisites for this course (if any): 14016103-3
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

Mobile Security course will provide students with a comprehensive knowledge into the main areas of mobile security aspects. Topics include secure Mobile Computing and Application Development; this includes hands-on practical exposure to apps development in location and context aware environments. Mobile Communication modalities will be covered, including: 3G/4G communication networks, Wi-Fi and Personal Area Networks, Mobile Privacy and Ethical issues. The gained knowledge will be applied in different mobile computing business environments such as mobile healthcare (m-health), mobile commerce (m-commerce), mobile learning (m-learning) and mobile web services (m-WS).

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:

This module is delivered via a combination of lectures and practical sessions, tutorials, podcasts and quizzes. Due to the emerging nature of the topics addressed in this module, the use of news reports on recent security incidents and security blogs will be a valuable additional, up-to-date source of information. Lectures are designed to introduce students to the key features of each topic. Practical sessions will focus on implementing the theory discussed during the lectures via developing of mobile applications and hands-on exercises. The course assessment will take the form of a portfolio of coursework assignments including designing and implementing secure mobile applications with a report for a specific environment (e.g. m-health, m-commerce, m-learning) and a case study assignment to assess the comprehension and academic application of the material taught.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Secure Mobile Technology Development	2	6
Mobile User Interface Modalities and Human Factors	1	3
Mobile Operating Systems and Device Security	1	3

Location-based and Context-aware Services	1	3
Mobile Communication mechanisms: 3G/4G Cellular Networks, Wi-Fi and Bluetooth	2	6
Mobile Web Services – secure and dependable provisioning of web services from mobile platforms	1	3
Security, trust and privacy in mobile computing environments	1	3
Examples of applications of mobile computing and their security	1	3
M-health – mobile computing and communications technologies for healthcare	2	6
M-Commerce – E-Commerce on Mobile Devises	1	3
M-learning – using secure mobile apps for learning and education	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Demonstrate the principles of different mobile platforms including their wireless interface modalities, protocols and security	Lecture, discussion	Exams, HWs, Quizzes
1.2	present a critical awareness of the social and ethical issues in data communications over mobile computing environment.	Lecture, discussion	Exam, HWs, Quizzes
1.3	critically discuss the overarching principles underpinning security in mobile computing	Lecture, discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Analyzing the cyberattacks and technical solutions designed to detect misleading data	Lecture, Project	Exam, HWs
3.0	**Interpersonal Skills & Responsibility**		
3.1	implement secure mobile applications based on cutting-edge technology in mobile computing	Group discussion, Project	Project Report, Project 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
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for implementation of algorithms on various platforms	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	Assignment 1	2	5%
2	Quiz 1	3	5%
3	Assignment 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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)
xiii. Office Hours for student counseling and support – Three hours/week
xiv. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks vii. Protecting Mobile Networks and Devices: Challenges and solutions, Weizhi Meng, Xiapu Luo, Steven Furnell, Jianying Zhou, 2016, ISSN: 9781498735926 viii. Laurence T. Yang, Evi Syukur and Seng W. Loke, Handbook on Mobile and Ubiquitous Computing; Status and Perspective, CRC press 2016, ISBN: 1439848122 ix. Mohammad Ilyas and Imad Mahgoub, Mobile Computing Handbook, Boca Raton (2005) x.
2. List Essential References Materials (Journals, Reports, etc.) xii. IEEE transaction on Mobile Computing, Electronic journal - available via the E-resources at Kingston University library http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=7755 , IEEE. xiii.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. vii.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. vii.

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.) xiii. One classroom (25 seats) xiv. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) xviii. Whiteboard xix. Internet connection xx. Smart Board

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 viii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xiii. Course file of the course will be maintained and evaluated by some senior faculty member. xiv. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development vii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xiii. A random sample from the marked papers may be evaluated by an independent senior faculty member. xiv. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xiii. Department has curriculum committee that periodically review courses. xiv. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan H. almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Securing Enterprise Infrastructure using Security Techniques

Course Code: 14016327-3

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: Securing Enterprise Infrastructure using Security Techniques 14016327-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Sultan Almotiri			
5. Level/year at which this course is offered: Level 2 or 3			
6. Pre-requisites for this course (if any): 14016103-3			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

This course prepares students to protect large Windows Based infrastructure services.

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:

The course reinforces cyber security methods in critical infrastructures equipping students with the knowledge and hands on experience of protecting large Windows Based infrastructure services. Students will also gain insight into complex cyber security system design, deployment, and ongoing maintenance.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Overview of Issues Related to Information Systems Security	2	6
Windows Systems and Secure Access Control	1	3
Windows Systems and Encryption/Application Rules	1	3
Control Setup and How to Protect Windows from Malware	1	3
Windows System Security and Group Policy Controls	2	6
Backup and Restore Operations on Windows Systems	1	3
Windows Network and Systems for Security Vulnerabilities	2	6
Windows Application Software for Security Vulnerabilities	1	3
Handling and Managing Security Incidents of Windows Systems	1	3

Best Practices in Managing Changes in Windows Systems and Applications	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Describe information systems security.	Lecture, discussion	Exams, HWs, Quizzes
1.2	Describe the basic Windows OS architecture	Lecture, discussion	Exam, HWs, Quizzes
1.3	Define the principle of least privilege	Lecture, discussion	Exam, HWs, Quizzes
1.4	List encrypted Microsoft Windows protocols	Lecture, discussion	Exams, HWs, Quizzes

1.5	Define the purpose of malware	Lecture, discussion	Exams, HWs, Quizzes
1.6	Describe auditing and managing Group Policy	Lecture, discussion	Exams, HWs, Quizzes
1.7	List backup and restore operations in a business continuity plan	Lecture, discussion	Exams, HWs, Quizzes
1.8	List the best practices for securing Microsoft Windows operating system and application software	Lecture, discussion	Exams, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Explain the purpose of access control, authentication, and creating users and groups	Lecture, Project	Exam, HWs
2.2	Summarize the business advantages and challenges of Active Directory	Lecture, Case studies,	Exams, Reports
2.3	Explain the business challenges of managing vulnerabilities	Lecture, Project	Project Report, Project presentation
2.4	Summarize business challenges of implementing encryption	Lecture, Case studies,	Exams, Reports
2.5	Explain best practices for malware prevention	Lecture, Project	Exam, HWs
2.6	Explain the relationship between Group Policy and security policy	Lecture, Project	Project Report, Project presentation
2.7	Explain how to use common Windows security profiling tools	Lecture, Project	Exams, Reports
2.8	Compare different options for creating backups	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	Use security features of directory services	Group discussion, Project	Project Report, Project presentation
3.2	Analyze access controls and authentication	Group discussion, Project	Project Report, Project presentation
3.3	Analyze best practices for managing Microsoft Windows and application vulnerabilities	Lectures, discussion	Anti-plagiarism software, paper review, presentation
3.4	Analyze encryption in communication	Lectures, discussion	Project Report, Project presentation

3.5	Analyze how malware code spreads and operates, and where it resides	Lectures, discussion	Project Report, Project presentation
3.6	Analyze business challenges of Group Policy	Group discussion, Project	Project Report, Project presentation
4.0	**Communication, Information Technology, Numerical**		
4.1	Assess the anatomy of Microsoft Windows systems and their application vulnerabilities	Project	Project Report, Project presentation
4.2	Evaluate the purposes of users and groups	Lecture, Project	Project Report, Project presentation
4.3	Illustrate the use of Windows ACLs (Access Control List)	Lecture, Project	Exams, Project Report, Project presentation
4.4	Assess the effects of malicious code	Lecture, Project	Exams, Project Report, Project presentation
4.5	Illustrate how to make Group Policy conform to security policy	Lecture, Project	Exams, Project Report, Project presentation
4.6	Demonstrate how to use Windows security auditing tools	Lecture, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for implementation of algorithms on various platforms	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	Assignment 1	2	5%
2	Quiz 1	3	5%
3	Assignment 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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)
xv. Office Hours for student counseling and support – Three hours/week
xvi. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks i. Security Strategies in Windows Platforms and Applications, Second Edition, ISBN-13: 9781284031652 ii.
2. List Essential References Materials (Journals, Reports, etc.) i. Chatterjee, S., Sarker, S., & Valacich, J. S. (2015). The Behavioral Roots of Information Systems Security: Exploring Key Factors Related to Unethical IT Use. Journal of Management Information Systems, 31(4), 49-87. doi:10.1080/07421222.2014.1001257 ii. Istikoma, Bt Fakhri, N. F., Qurat-ul-Ain, & Ibrahim, J. (2015). Information Security Aligned To Enterprise Management. Middle East Journal of Business, 10(1), 62-66. iii. WINDOWS 10 SECURITY. (2015). Journal of Property Management, 80(3), 39. iv. Nanavati, M., Colp, P., Aiello, B., & Warfield, A. (2014). Cloud Security: A Gathering Storm. Communications of the ACM, 57(5), 70-79. doi:10.1145/2593686 v. Shafiq, A., Aslam, M., Ahmed, A., & Islam, S. (2015). Prevention from Malicious Programs for Handling Security Issues in Mobile Cloud Computing. Science International, 27(2), 1203 xiv.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. viii.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. viii.

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.) xv. One classroom (25 seats) xvi. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) xxi. Whiteboard xxii. Internet connection xxiii. Smart Board
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 ix. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xv. Course file of the course will be maintained and evaluated by some senior faculty member. xvi. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development viii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xv. A random sample from the marked papers may be evaluated by an independent senior faculty member. xvi. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xv. Department has curriculum committee that periodically review courses. xvi. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan H. almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Introduction to Blockchain

Course Code: 14016328-3

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: Introduction to Blockchain 14016328-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Khaled Tarmissi			
5. Level/year at which this course is offered: Level 2 or 3			
6. Pre-requisites for this course (if any): 14016103-3			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

Upon successful completion of this course, students will:

- Have the conceptual foundations to engineer secure software that interacts with the blockchain.
- Be able to integrate ideas from the blockchain in their own projects.
- Comprehend and critique relevant research papers in the area of blockchain systems.
- Present research ideas both orally in a concise way and within the allotted time as well as in writing.
- Defend the research approach, design decisions, and the evaluation methods in a discussion.
- Moderate a discussion after a research presentation.

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:

This class covers the blockchain – the technology behind Bitcoin. Introduced in 2008, Bitcoin has shown that blockchain can serve as a distributed ledger that records monetary transactions. But the blockchain technology has many more applications than this. That realization has lately blossomed into a dazzling array of startup companies, initiatives, corporate alliances, and research projects – a new industry where billions of dollars are being invested. This course will address important questions about: how does blockchain work? what makes it different? how secure is the blockchain?

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
1: What is Blockchain and why does it matter? Course Introduction Fundamental concepts: Money, Currency, Ledgers Foundational Background Bitcoin Core	1	3
2: Introduction to Cryptography - Classic ciphers Symmetric Cryptography: - Hash functions - Hash pointers Asymmetric Cryptography: - Keys & Digital signatures	2	6
3: Algorithms - Binary Trees - Merkle trees - Elliptic curves - SHA-256 - RIPEMD-160 - Base64 & Base58 Bitcoin Cryptocurrency: - Introduction to Transactions & Blockchain	2	6

4: Bitcoin Cryptocurrency: - Transactions & Blockchain - Wallet Technology	1	3
5: Mining & Consensus	1	3
6: Bitcion - Scripts Docker Interlude	1	3
7: Networking background Sockets & RPC Docker Build & Compose	1	3
8: Distributed Systems & Peer-To-Peer Networking Bitcoin Networking	1	3
9: Wallets Bloom Filters & Merkle Proofs The Whole Enchilada	1	3
10: Putting the technology together – examples of implementations with their tradeoffs.	2	6
11: Final Project Presentations	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Explain the concepts of cryptocurrency, blockchain, and distributed ledger technologies	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Summarize important laws regarding Blockchain	Lecture, Group discussion	Exam, HWs, Quizzes
1.3	Understandings of Distributed Ledger Technologies and how they work.		
2.0	**Cognitive Skills**		
2.1	Analyze the application and impact of blockchain technology in the financial industry and other industries	Lecture, Project	Exam, HWs
2.2	Describe blockchain methodology.	Lecture, Case studies.	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	Evaluate security issues relating to blockchain and cryptocurrency.	Lecture, Group discussion, Project, Case studies	Project Report, Project presentation
3.2			
4.0	**Communication, Information Technology, Numerical**		
4.1	Identify trends in and resources for digital forensics.	Lecture, Group discussion, Project	Exam, HWs, Quizzes
4.2	Design and analyse the impact of blockchain technology in other markets	Lecture, Project Report, Project presentation, Case studies	Exams, HWs, Reports

4.3	Understandings of current trends of Blockchain, and ability to imagine its usecases and future.	Lecture, Group discussion, Project, Case studies	Exams, HWs, Quizzes
5.0	**Psychomotor (if any)**		
5.1			

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	Assignment 1	2	5%
2	Assignment 2	5	5%
3	Assignment 3	10	5%
4	Midterm Exam	8	20%
5	Project	14	25%
6	Final Exam	15	40%
7			
8			

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)
xvii. Office Hours for student counseling and support – Three hours/week
xviii. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks
xi. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction. Princeton University Press (July 19, 2016)
2. List Essential References Materials (Journals, Reports, etc.)
xv.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
ix.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
ix.

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.)
xvii. One classroom (25 seats)
xviii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xxiv. Whiteboard
xxv. Internet connection
xxvi. Smart Board
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

x. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xvii. Course file of the course will be maintained and evaluated by some senior faculty member. xviii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development ix. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xvii. A random sample from the marked papers may be evaluated by an independent senior faculty member. xviii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xvii. Department has curriculum committee that periodically review courses. xviii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Khaled Tarmissi

Signature: *Khaled Tarmissi* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advanced Topics in Cyber Security

Course Code: 14016429-3

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: Advanced Topics in Cyber Security 14016429-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Sultan Almotiri
5. Level/year at which this course is offered: level 3/ year 2
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

Advanced topics selected from current literature that deals with theory, methods and tools to address any potation attacks and their solutions tools in real world. The specific content of an offering of the course should focus on a specific area of Cyber Security.

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:

The course will teach state of the art theoretical and practical knowledge in the field of Data Science. Students will be assigned assignments and project to get hands on experience. At the end of the course, a seminar/presentation event will take place in which students will present their course projects/research work.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
TBA (To Be Announced)	1-14	42

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	An ability to recognize the use of security tools in solving real life problems and attacks	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	An ability to identify current techniques, skills, and tools necessary for protecting and securing the systems	Lecture, Group discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate system, process, component, or program on security tools	Lecture, Project	Exam, HWs
2.2	Investigate real world problems and vulnerable in the context of Cyber Security and designed innovative solutions	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation
3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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	Use of latest security tools	Lecture, Project	Project Report, Project presentation

4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of algorithms.	Lecture, Case studies, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for computing system	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	HW 1	2	5%
2	Quiz 1	3	5%
3	HW 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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

E Learning Resources

1. List Required Textbooks ii. Decided by the teacher
2. List Essential References Materials (Journals, Reports, etc.) ii. Recent Papers in Cyber Security Research
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. iii. Springer Journal of Cyber Security iv. IEEE Transactions on Cyber Security
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. ii.

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.) iii. One classroom (25 seats) iv. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) iii. Whiteboard iv. Internet connection
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 ii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.

2. Other Strategies for Evaluation of Teaching by the Instructor or the Department iii. Course file of the course will be maintained and evaluated by some senior faculty member. iv. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development ii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) iii. A random sample from the marked papers may be evaluated by an independent senior faculty member. iv. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. iii. Department has curriculum committee that periodically review courses. iv. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan Almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Cloud Computing and Big Data

Course Code: 14016311-3

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: Cloud Computing and Big Data 14016311-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Basem Alkazemi
5. Level/year at which this course is offered: level 2 or 3
6. Pre-requisites for this course (if any): 14016102-3
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of cloud computing applications and bigdata processing.

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 coursework and prototypes.

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

Course Description:

The course will aim to introduce students to both the theoretical background of cloud computing as well as the practical applications. The processing of large datasets using Big Data techniques, map-reduce and other techniques will be a large focus. In addition the course will cover approaches to building applications and managing them on the cloud.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Origins and background of Cloud Computing	2	6
Using Cloud services	2	6
Map-reduce and Big Data analytics	2	6
Extracting of Bayesian Networks from large unstructured datasets	1	3
Theory of Cloud Computing	2	6
NoSQL databases and scalable data storage	2	6
Data science and big data analytics at career builder	1	3
Real time stream analytics	1	3

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

	Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total

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 *Theory of cloud computing*	Lectures	Exam, Quizzes
1.2	Understand map-reduce framework	Lectures	Exams, Homework, Quizzes
1.3	Understand different data analytical algorithms	Lectures	Exam, Homework, Quizzes
1.4	Identify current tools for bigdata processing	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	Develop basic map-reduce application	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate the impact of Hadoop Clusters size on bigdata processing performance	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate real world bigdata processing application on Hadoop	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 bigdata processing applications	Project	Project Report, Project presentation
4.3	Demonstrate the ability to use formal and statistical techniques in the design and analysis of map-reduce bigdata processing application	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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks
xxix. Big-Data Analytics and Cloud Computing: Theory, Algorithms and Applications 1st ed. 2018 Edition. ISSN: 9783319797670
xxx. Hadoop in Practice: Includes 104 Techniques 2nd Edition,2014.
2. List Essential References Materials (Journals, Reports, etc.)
xiii. Recent Papers in BigData related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
xii. SQL, Java or Python.

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.)
xxv. One classroom (25 seats)
xxvi. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xvii. Whiteboard
xviii. Internet connection
xxix. 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

xiii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xxv. Course file of the course will be maintained and evaluated by some senior faculty member. xxvi. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development xiii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xxv. A random sample from the marked papers may be evaluated by an independent senior faculty member. xxvi. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xxv. Department has curriculum committee that periodically review courses. xxvi. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Basem Alkazemi

Signature: *Basem Alkazemi* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Data Management and Governance

Course Code: 14016312-3

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 Management and Governance 14016312-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Sultan Almotiri			
5. Level/year at which this course is offered: Level 2 or 3			
6. Pre-requisites for this course (if any): 14016102-3			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

This is a core module explores ways that organizations manage, store and secure data. The students will be introduced to the methods, techniques and tools that organizations use to collect, manage, store and secure data. Different approaches and methods will be explored to model data requirements into entity relationship diagrams, logical diagrams and normalization. The students will also explore the actual database implementation issues using a database management system. Essential knowledge of data security issues like policies, structures and practices used to ensure data security and confidentiality and the way that such issues are addressed is also provided.

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)

Investigate the issues in the broader perspective of data and information management and explore methods and techniques for the analysis, design and implementation of databases. Explore the theory and practice of database design and implementation. Provide a practical understanding and use of database management systems. Provide knowledge of the fundamental principles and techniques employed in securing information and networks and enable them to obtain an understanding of current security technologies. Investigate the fundamental principles and techniques of cryptography and enable them to understand and deploy systems that use cryptographic principles

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

Course Description:

This module is delivered via a combination of lectures and practical sessions, tutorials, podcasts and quizzes. Due to the emerging nature of the topics addressed in this module, the use of news reports on recent security incidents and security blogs will be a valuable additional, up-to-date source of information. Lectures are designed to introduce students to the key features of each topic. Practical sessions will focus on implementing the theory discussed during the lectures via developing of mobile applications and hands-on exercises. The course assessment will take the form of a portfolio of coursework assignments including designing and implementing secure mobile applications with a report for a specific environment (e.g. m-health, m-commerce, m-learning) and a case study assignment to assess the comprehension and academic application of the material taught.

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact hours

Data Models	2	6
General Database Concepts	2	6
Object-Relational Database Concepts	1	3
Non-Relational Databases	1	3
Database Architectures	2	6
Database Integration	2	6
Data & Information Management Issues	1	3
Introduction to information and data governance	1	3
Cryptography Fundamentals	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Explain the fundamental concepts of data modeling	Lecture, discussion	Exams, HWs, Quizzes

1.2	Explain the database design and implementation	Lecture, discussion	Exam, HWs, Quizzes
1.3	Describe data encryption techniques suitable for encrypting, signing and protecting data and highlight their correct usages.	Lecture, discussion	Exam, HWs, Quizzes
1.4	understand the principles and techniques of steganography, and how these can be used.	Lecture, discussion	Exams, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Translate process models and systems requirement models into a database design using class diagrams and entity relationship diagrams and write SQL statements for the definition, access and control of data	Lecture, Project	Exam, HWs
2.2	Evaluate the steganography techniques	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	Evaluate different approaches to the storage and management of unstructured data such as images and multimedia data	Group discussion, Project	Project Report, Project presentation
3.2	Critically ass's information governance within the context of different organizations	Group discussion, Project	Project Report, Project presentation
3.3	Deploy data encryption techniques	Lectures, discussion	Anti-plagiarism software, paper review, 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	Evaluate the security risks presented by computer networks and understand the role of Vulnerability Assessment tools and other security-related software and be able to put them to use and design and deploy a firewall to secure a network	Lecture, Project	Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for implementation of algorithms on various platforms	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	Assignment 1	2	5%
2	Quiz 1	3	5%
3	Assignment 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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)
xix. Office Hours for student counseling and support – Three hours/week
xx. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks
i. Connolly, T.M & Begg, C, Strachan, A (2009) Database Systems A Practical Approach to Design, Implementation & Management, 5th Edition, (Addison-Wesley). ISBN: 0134410955
2. List Essential References Materials (Journals, Reports, etc.)
i. Bishop, M. (2003) Computer Security, Art and Science (Addison Wesley), ISBN: 0321712331
xvi.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
x.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
x.

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.)
xix. One classroom (25 seats)
xx. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xvii. Whiteboard
xviii. Internet connection
xxix. Smart Board
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

xi. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xix. Course file of the course will be maintained and evaluated by some senior faculty member. xx. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development x. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xix. A random sample from the marked papers may be evaluated by an independent senior faculty member. xx. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xix. Department has curriculum committee that periodically review courses. xx. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan H. almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Data Mining

Course Code: 14016313-3

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 14016313-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (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: level 2 or 3
6. Pre-requisites for this course (if any):14016102-3
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

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/ Studio	Practical	Other	Total
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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks
xxxi. Han, Jiawei, Jian Pei, and Micheline Kamber. Data mining: concepts and techniques. Elsevier, 2011.
xxii. Witten, Ian H., Eibe Frank, Mark A. Hall, and Christopher J. Pal. Data Mining: Practical machine learning tools and techniques. Morgan Kaufmann, 2016.
2. List Essential References Materials (Journals, Reports, etc.)
xiv. Recent Papers in Data Mining related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
xiii. 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.)
xvii. One classroom (25 seats)
xviii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xl. Whiteboard
xli. Internet connection
xlii. 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 xiv. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xvii. Course file of the course will be maintained and evaluated by some senior faculty member. xviii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development xiv. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xvii. A random sample from the marked papers may be evaluated by an independent senior faculty member. xviii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xvii. Department has curriculum committee that periodically review courses. xviii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Muhammad Arif

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

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: GIS Analytics

Course Code: 14016314-3

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: GIS Analytics 14016314-3		
2. Credit hours: 3		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Basem Alkazemi		
5. Level/year at which this course is offered: level 2 or 3		
6. Pre-requisites for this course (if any): 14016102-3		
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	percentage?	100
b. Blended (traditional and online)	percentage?	
c. E-learning	percentage?	
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of GIS applications and data visualizations..

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 coursework and prototypes.

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

Course Description:

This course introduces students to the principles of geographically referenced data management systems. Upon successful completion of this course students should be able to compile map layers linked to data files, analyse georeferenced data and produce two dimensional thematic maps.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introducing GIS	1	3
ArcGIS	2	6
Working with ArcMap	2	6
Coordinate Systems and Map Projections	2	6
Working with Tables	2	6
Spatial Joins	2	6
Geocoding	1	3
Working with Geodatabases	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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 *Theory of GIS*	Lectures	Exam, Quizzes
1.2	Understand Spatial Data	Lectures	Exams, Homework, Quizzes
1.3	Understand different Geocoding methodologies and APIs	Lectures	Exam, Homework, Quizzes
1.4	Identify current tools for GIS applications	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	develop basic geospatial database	Lecture, Case studies	Exams, Quizzes, Homework
2.2	Evaluate the impact of spatial joins on performance	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate real world geocoding and data visualization on map 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 GIS applications domain.	Project	Project Report, Project presentation
4.3	Demonstrate the ability to use formal and statistical techniques in the design and analysis of geospatial applications.	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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks
xxiii. Getting to Know ArcGIS: For 10.3/10.3.1 Fourth Edition,2015.
xxiv. GIS Fundamentals: A First Text on Geographic Information Systems, Fifth Edition Paperback – May 1, 2016.
2. List Essential References Materials (Journals, Reports, etc.)
xv. Recent Papers in GIS related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
xiv. SQL, python

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.)
xxix. One classroom (25 seats)
xxx. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xliii. Whiteboard
xliv. Internet connection
xlv. 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

xv. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xxix. Course file of the course will be maintained and evaluated by some senior faculty member. xxx. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development xv. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xxix. A random sample from the marked papers may be evaluated by an independent senior faculty member. xxx. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xxix. Department has curriculum committee that periodically review courses. xxx. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Basem Alkazemi

Signature: *Basem Alkazemi* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Information Retrieval and Web Search

Course Code: 14016315-3

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: Information Retrieval and Web Search 14016315-3		
2. Credit hours: 3		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Basem Alkazemi		
5. Level/year at which this course is offered: level 2 or 3		
6. Pre-requisites for this course (if any): 14016102-3		
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	percentage?	100
b. Blended (traditional and online)	percentage?	
c. E-learning	percentage?	
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of information retrieval tools and techniques.

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 coursework and prototypes.

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

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 -- the web -- and it is the area in which most people interact with IR systems most frequently.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Efficient text indexing	1	3
Index construction and index compression	2	6
Boolean and vector-space retrieval models	2	6
Evaluation and interface issues	1	3
relevance feedback and query expansion	2	6
web search basics	1	3
Link analysis	1	3
Document clustering and classification	2	6
hierarchical clustering	1	3

Matrix decompositions and latent semantic indexing	1	3
Traditional and machine learning-based ranking approaches	3	9

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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 Information Retrieval	Lectures	Exam, Quizzes
1.2	Understand web search algorithms	Lectures	Exams, Homework, Quizzes
1.3	Understand different text classification methods	Lectures	Exam, Homework, Quizzes
1.4	Identify current tools for Information Retrieval	Lectures, Project	Exam, Homework, Project report
2.0	**Cognitive Skills**		
2.1	Develop a text processing prototype	Lecture, Case studies	Exams, Quizzes, Homework

2.2	Evaluate information retrieval accuracy	Lecture, Case studies,	Exams, Quizzes, Homework
2.3	Design, implement and evaluate real world information retrieval 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 information retrieval domain	Project	Project Report, Project presentation
4.3	Demonstrate the ability to use formal and statistical techniques in the design and analysis of information retrieval 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 Report	11	15%
9	Project Presentations	12	5%
10	Final Exam	14	40%

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

E Learning Resources

1. List Required Textbooks
xxv. Introduction to Information Retrieval, by C. Manning, P. Raghavan, and H. Schütze (Cambridge University Press, 2017) ISSN: 9781107666399
xxvi. Information Retrieval: Algorithms and Heuristics (2nd Edition) ISSN: 9781402030055, 2012.
2. List Essential References Materials (Journals, Reports, etc.)
xvi. Recent Papers in IR related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
xv. Java or python

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.)
xxxi. One classroom (25 seats)
xxii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xlvi. Whiteboard
xlvii. Internet connection
lviii. 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

xvi. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xxxi. Course file of the course will be maintained and evaluated by some senior faculty member. xxii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development xvi. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xxxi. A random sample from the marked papers may be evaluated by an independent senior faculty member. xxii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xxxi. Department has curriculum committee that periodically review courses. xxii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Basem Alkazemi

Signature: *Basem Alkazemi* **Date Completed:** Nov. 19, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Social Media Analytics

Course Code: 14016316-3

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: Social Media Analytics 14016316-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Murtaza Ali Khan
5. Level/year at which this course is offered: Level 2 or 3
6. Pre-requisites for this course (if any): 14016102-3
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of social media data analysis.

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 course will teach state of the art theoretical and practical knowledge in the field of data visualization. Students will be assigned assignments and project to implement the visualization techniques to get hands on experience. At the end of the course, a seminar/presentation event will take place in which students will present their course projects/research work.

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

Course Description:

The course covers concepts and techniques for retrieving, exploring, visualizing, and analyzing social network and social media data, website usage, and clickstream data. Students learn to use key metrics to assess goals and return on investment, perform social network analysis to identify important social actors, subgroups, and network properties in social media.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Text Analytics on Social media	2	6
Network Analysis methods	2	6
Actions Analytics on social platform	2	6
Social Media Apps Analytics	1	3
Social Media Hyperlinks Analytics	2	6
Social Media Location Analytics	2	6
Social Media Search Engine Analytics	1	3
Aligning Social Media Analytics with Business Goals	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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 the fundamental mathematical and computing principles of social media analytics	Lecture, Group discussion	Exams, Homework, Quizzes
1.2	Ability to apply knowledge of computing to write social media analytics code	Lecture, Group discussion	Exam, Homework, Quizzes
1.3	An ability to extract desired knowledge (e.g., business forecast) from social media networks such as Facebook and Twitter	Lecture, Group discussion	Exam, Homework, Quizzes
2.0	**Cognitive Skills**		
2.1	Apply conceptual understanding of social media analytics principles and theories	Lecture, Project	Exam, Homework
2.2	Implement and evaluate social media analytics process, component, or program	Lecture, Case studies,	Exams, Reports
2.3	Investigate the real-world problems in the context of social media analytics and design innovative solutions	Lecture, Project	Project Report, Project presentation
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation

3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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	Use of latest social media analytics tools	Lecture, Project	Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for social media analytics	Research activities, Projects	Project, Homework, 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	Homework 1	2	5%
2	Quiz 1	3	5%
3	Homework 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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. Seven Layers of Social Media Analytics: Mining Business Insights from Social Media Text, Actions, Networks, Hyperlinks, Apps, Search Engines, and Location Data. Khan, Gohar F. CreateSpace Ind, 2015, ISSN: 9781507823200 ii. Learning Social Media Analytics with R, Tushar Sharma, Dipanjan Sarkar, Raghav Bali, Packt Publishing, 2017, ISSN: 9781787125469. iii. Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, GitHub, and More. Russell, Matthew A. " O'Reilly Media, Inc.", 2018, ISSN: 9781491985045
2. List Essential References Materials (Journals, Reports, etc.) i. Recent Papers in Social Media Analytics related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. i. Facebook, Twitter to extract data and apply social media analytics.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. i. Twitter, Facebook APIs to be use in conjunctions of social media analytics tools

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. Visualization software ii. Whiteboard iii. Internet connection

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 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.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Murtaza Ali Khan

Signature: *Murtaza Ali Khan* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Healthcare Analytics

Course Code: 14016417-3

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: Healthcare Analytics 14016417-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Sultan Almotiri
5. Level/year at which this course is offered: Level 2 or 3
6. Pre-requisites for this course (if any):14016102-3
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of analytics in healthcare.

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)

This course covers techniques and systems for analytics in healthcare. Students will study big data techniques in the context of concrete healthcare analytic applications such electronics health records, medical image & signal analysis, clinical data mining, predictive models, genomic data, clinical decision support systems. Students will use big data analytic systems such as Hadoop (MapReduce paradigm), Hive, Pig, HBase, etc..

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

Course Description:

This course will enable participants to understand emerging trends and issues in eHealth and how to manage technology initiatives that produce innovations to impact digital management of healthcare information

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introduction to healthcare data	1	3
Electronic health records	1	3
Biomedical image and signal analysis	2	6
Data mining for clinical data	2	6
Clinical prediction models	2	6
Genomic data analysis for personalized medicine	2	6
Predictive Models for Integrating clinical and genomic Data	2	6
Clinical decision support systems	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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 conceptual and practical issues related to the collection, sharing, and structuring of healthcare data	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	An ability to identify current techniques, skills, and tools necessary for the development of secure Cloud based systems	Lecture, Group discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Know how to find, download/extract, clean, and do descriptive analyses on a variety of healthcare datasets	Lecture, Project	Exam, HWs
2.2	Apply critical thinking and technical skills to the use of data to inform business and policy decisions	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	Understand concepts related to healthcare data innovation, "Big Data" analytics, descriptive data analytics, and predictive data analytics	Group discussion, Project	Project Report, Project presentation
3.2	Understand current barriers in healthcare management and how data analytics can provide potential solutions to improve quality, lower cost, and advance outcomes	Group discussion, Project	Project Report, Project 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	Work within a multidisciplinary team setting	Lecture, Project	Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for computing system	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	HW 1	2	5%
2	Quiz 1	3	5%
3	HW 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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

E Learning Resources

1. List Required Textbooks iii. Chandan K. Reddy, Charu C. Aggarwal. Healthcare Data Analytics, Chapman & Hall/CRC, 2015 iv. Prashant Natarajan, John C. Frenzel and Detlev H. Smaltz. Demystifying Big Data and Machine Learning for Healthcare, CRC Press, 2017 v. William Perrizo, Ruowang Li, Baoying Wang. Big Data Analytics in Bioinformatics and Healthcare. IGI Global, 2014
2. List Essential References Materials (Journals, Reports, etc.) iii. Recent Papers in Healthcare Analytics
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. v. Springer Journal of Healthcare Analytics vi. IEEE Transactions on Healthcare Analytics
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. iii.

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.) v. One classroom (25 seats) vi. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) v. Whiteboard vi. Internet connection
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 iii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department v. Course file of the course will be maintained and evaluated by some senior faculty member. vi. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development iii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) v. A random sample from the marked papers may be evaluated by an independent senior faculty member. vi. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. v. Department has curriculum committee that periodically review courses. vi. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan Almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Business Analytics

Course Code: 14016418-3

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: Business Analytics 14016418-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Sultan Almotiri
5. Level/year at which this course is offered: Level 2 or 3
6. Pre-requisites for this course (if any):14016102-3
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of analytics in Business.

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)

To successfully compete in today's global business environment an organization must constantly monitor, recognize and understand every aspect and every issue of its operations, its industry and the overall business environment. This course focuses on business analytics– an information technology approach to data collection and data analysis to support a wide variety of management tasks, from performance evaluation to trend spotting and policy making. Students learn analytical components and technologies used to create dashboards and scorecards, and artificial intelligence techniques used to develop intelligent systems for decision support. Students will actively participate in this course through class discussions, project preparation and presentation, and visual tool utilization.

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

Course Description:

This course will enable participants to understand emerging trends and issues in Business and how to manage technology initiatives that produce innovations to impact digital management of business information

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
An Overview of Business Intelligence, Analytics, and Decision Support	1	3
Foundations and Technologies for Decision Making	1	3
Data Warehousing	2	6
Business Reporting, Visual Analytics, and Business Performance Management	2	6
Techniques for Predictive Modeling	2	6
Automated Decision Systems and Expert Systems	2	6
Knowledge Management and Collaborative Systems	2	6
Business Analytics: Emerging Trends and Future Impacts	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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 conceptual and practical issues related to the collection, sharing, and structuring of Business data	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Define the decision problem and determine what information is needed	Lecture, Group discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Acquire trustworthy and relevant data and judge its quality	Lecture, Project	Exam, HWs
2.2	Apply critical thinking and technical skills to the use of data to inform business and policy decisions	Lecture, Case studies,	Exams, Reports
2.3	able to analyze and interpret output (graphs, tables, mathematical models, etc.)	Lecture, Group discussion	
2.4	understand data gathering and input considerations	Lecture, Case studies,	
3.0	**Interpersonal Skills & Responsibility**		

3.1	Analyze data to make strategic and tactical business decisions using statistical models	Group discussion, Project	Project Report, Project presentation
3.2	Analysis data using software package;	Group discussion, Project	Project Report, Project 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	Work within a multidisciplinary team setting	Lecture, Project	Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for computing system	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	HW 1	2	5%
2	Quiz 1	3	5%
3	HW 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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

E Learning Resources

1. List Required Textbooks vi. Ramesh Sharda, Dursun Delen, Efraim Turban, Business Intelligence and Analytics: Systems for Decision Support, 10th Edition, 2018.
2. List Essential References Materials (Journals, Reports, etc.) iv. Recent Papers in Business Analytics
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. vii. Springer Journal of Business Analytics viii. IEEE Transactions on Business Analytics
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. iv.

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.) vii. One classroom (25 seats) viii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) vii. Whiteboard viii. Internet connection
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

iv. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department vii. Course file of the course will be maintained and evaluated by some senior faculty member. viii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development iv. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) vii. A random sample from the marked papers may be evaluated by an independent senior faculty member. viii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. vii. Department has curriculum committee that periodically review courses. viii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan Almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advanced Topics in Data Science

Course Code: 14016419-3

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: Advanced Topics in Data Science 14016419-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Sultan Almotiri
5. Level/year at which this course is offered: level 3/ year 2
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

Advanced topics selected from current literature that deals with theory and methods to address three key challenges in data sciences: estimation, prediction, and computation. We use convex analysis and methods as a common connecting theme and illustrate the main ideas on concrete applications from machine learning and signal processing. The specific content of an offering of the course should focus on a specific area of Data Science.

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:

The course will teach state of the art theoretical and practical knowledge in the field of Data Science and Statistics. Students will be assigned assignments and project to get hands on experience. At the end of the course, a seminar/presentation event will take place in which students will present their course projects/research work.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
TBA (To Be Announced)	1-14	42

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	An ability to recognize the use of Data Science in solving real life problems	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	An ability to identify current techniques, skills, and tools necessary for the development of data science techniques and methods	Lecture, Group discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate system, process, component, or program on Cloud	Lecture, Project	Exam, HWs
2.2	Investigate real world problems in the context of Data Science and design innovative solutions	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation
3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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	Use of latest development tools	Lecture, Project	Project Report, Project presentation

4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of algorithms.	Lecture, Case studies, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for computing system	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	HW 1	2	5%
2	Quiz 1	3	5%
3	HW 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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

E Learning Resources

1. List Required Textbooks vii. Decided by the teacher
2. List Essential References Materials (Journals, Reports, etc.) v. Recent Papers in Data Science Research
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. ix. Springer Journal of Data Science x. IEEE Transactions on Data Science
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. v.

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.) ix. One classroom (25 seats) x. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.) ix. Whiteboard x. Internet connection
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 v. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.

2. Other Strategies for Evaluation of Teaching by the Instructor or the Department ix. Course file of the course will be maintained and evaluated by some senior faculty member. x. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development v. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) ix. A random sample from the marked papers may be evaluated by an independent senior faculty member. x. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. ix. Department has curriculum committee that periodically review courses. x. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan Almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Introduction to Bio-Informatics

Course Code: 14016341-3

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: Introduction of Bio-Informatics 14016341-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Sultan Almotiri
5. Level/year at which this course is offered: level 2 or 3
6. Pre-requisites for this course (if any):N/A
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

This course is designed to give students both a theoretical background and a working knowledge of the techniques employed in bioinformatics. Emphasis will be placed on biological sequence (DNA, RNA, protein) analysis and its applications.

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)

This course is designed to introduce future biologists and physicians to bioinformatics tools and analysis methods. Upon completion of the course, students should be more comfortable working with the vast amounts of biomedical and genomic data and online tools that will be relevant to their work in the coming decades.

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

Course Description:

This course introduces Bioinformatics, and experience with select bioinformatics tools and databases currently utilized in the life sciences. Focus is on analysis, storage, and manipulation of genomic and proteomic information. Topics include major databases, common sequence formats, protein and nucleotide sequence alignment, BLAST, genome annotation, microarrays, gene expression, primer design, high-throughput data analysis.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introduction, Review of DNA replication, transcription, and translation, Genome organization	1	3
review of molecular biology methods	1	3
Introduction to DNA and protein databases, data storage, file formats, information retrieval	1	3
Database queries, sequence retrieval, Creation of restriction endonuclease maps	1	3
Dot plots, Sequence alignment, Local alignment, Global alignment, Multiple alignments	1	3
Sequence alignments continued, Alignment scores, Statistical significance of database searches	1	3
Genetic distances, Distance based phylogenies, Phylogenetic tree construction	1	3
Phylogenetic tree construction continued, Character based phylogenies	1	3

Consensus sequences, Finding genes and open reading frames in DNA sequences	1	3
Microarrays and the transcriptome	1	3
Microarray analysis and applications of microarrays	1	3
Introduction to proteomics	1	3
Prediction of protein structure and function	1	3
Comparative genomics continued, Future directions of bioinformatics	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	gaining comfort with interdisciplinary studies, computer science and mathematics applied to the life sciences	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Gain comfort with using biological databases	Lecture, Group discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		

2.1	Ability to describe the contents and properties of the most important bioinformatics databases, perform text- and sequence-based searches	Lecture, Project	Exam, HWs
2.2	understanding how to adjust parameters for programs, and understanding their effect on results, and understand better parameters based on the context,	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	learning to use online tools and databases, and various bioinformatics programs, while interpreting results, and generating conclusions,	Group discussion, Project	Project Report, Project presentation
3.2	understanding bioinformatics algorithms	Group discussion, Project	Project Report, Project presentation
3.3	Gain comfort with various bioinformatics programs	Lectures, discussion	Anti-plagiarism software, paper review, presentation
4.0	**Communication, Information Technology, Numerical**		
4.1	ability to search and retrieve information from genomic and proteomic databases	Project	Project Report, Project presentation
4.2	ability to analyze their search results using software available on the internet	Lecture, Project	Project Report, Project presentation
4.3	Use of latest development tools	Lecture, Project	Project Report, Project presentation
4.4	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of algorithms.	Lecture, Case studies, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for computing system	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	HW 1	2	5%
2	Quiz 1	3	5%
3	HW 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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

E Learning Resources

1. List Required Textbooks
viii. Bioinformatics and Functional Genomics, third edition, by Jonathan Pevsner, 2015, published by Wiley Black well.
ix. Bioinformatics: Sequence, Structure and Databanks: A Practical Approach (The Practical Approach Series, 236), Des Higgins (Editor), Willie Taylor. 1st edition, October 2000, Oxford University Press. ISBN: 978-0199637904.
x. Practical Bioinformatics, 1st ed., Agostino, M., Garland Science, 2013
xi.
2. List Essential References Materials (Journals, Reports, etc.)
vi. Recent Papers in bio-informatics Research
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
xi. Springer Journal of bio-informatics
xii. IEEE Transactions on bio-informatics
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
vi.

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.)
xi. One classroom (25 seats)
xii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xi. Whiteboard
xii. Internet connection
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 vi. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xi. Course file of the course will be maintained and evaluated by some senior faculty member. xii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development vi. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xi. A random sample from the marked papers may be evaluated by an independent senior faculty member. xii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xi. Department has curriculum committee that periodically review courses. xii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan Almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Distributed Systems

Course Code: 14016342-3

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: Distributed Systems 14016342-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Murtaza Ali Khan
5. Level/year at which this course is offered: Level 2 or 3
6. Pre-requisites for this course (if any): N/A
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

This course provides a graduate-level introduction to parallel and distributed systems. Both shared-memory parallel computers and distributed-memory clusters will be studied.

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 course will teach state of the art theoretical and practical knowledge in the field of parallel and distributed systems. Students will be assigned assignments and project to implement the distributed computing techniques to get hands on experience. At the end of the course, a seminar/presentation event will take place in which students will present their course projects/research work.

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

Course Description:

We will cover fundamental and current research topics in the design, implementation, and evaluation of parallel and distributed systems. Our focus will be on the systems software and distributed programming systems, but some hardware issues will also be covered. Topics will include parallel algorithms, parallelization strategies, virtual machines, and operating system support. Aspects of the practice and research issues in distributed will be covered.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introduction to parallel and distributed systems	1	3
Hardware architectures (multiprocessors, clusters, etc.)	2	6
Concurrency and synchronization	2	6
Data and work partitioning	2	6
Granularity	2	6
Load balancing	1	3
P-Threads, Locks and semaphores	2	6
MPI, MapReduce and Hadoop	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact	Planned	42					42

Hours	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 the fundamental of distributed systems	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Ability to apply knowledge of distributed computing to write distributed systems code	Lecture, Group discussion	Exam, HWs, Quizzes
1.3	An ability to recognize the use of distributed computing modeling methods to model real life data	Lecture, Group discussion	Exam, HWs, Quizzes
1.4	Develop ability to identify current techniques, skill, and tools necessary for the development of distributed computing solutions	Lecture, Group discussion	Exams, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Apply conceptual understanding of distributed systems principles and theories	Lecture, Project	Exam, HWs
2.2	Implement and evaluate distributed systems process, component, or program	Lecture, Case studies,	Exams, Reports
2.3	Investigate the real-world problems in the context of distributed systems and design innovative solutions	Lecture, Project	Project Report, Project presentation
3.0	**Interpersonal Skills & Responsibility**		

3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation
3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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	Use of latest high-performance computing tools	Lecture, Project	Project Report, Project presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of distributed computing systems.	Lecture, Case studies, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for a distributed computing system	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	HW 1	2	5%
2	Quiz 1	3	5%
3	HW 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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

E Learning Resources

1. List Required Textbooks
xii. Ajay D. Kshemkalyani. Distributed Computing: Principles, Algorithms, and Systems. Cambridge University Press, latest edition. 2011, ISSN: 9780521876346
xiii. Nicola Santoro. Design and Analysis of Distributed Algorithms. Wiley-Interscience, latest edition.
xiv. Distributed Systems: Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen,2017, ISSN: 9781530281756
xv.
2. List Essential References Materials (Journals, Reports, etc.)
xvii. Recent research papers in Distributed Systems journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
xi. https://twitter.com/, #hpc
xii. https://www.chpc.ac.za/
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
xi. Unix/Linux
xii. MATLAB, MPI, distributed computing 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.)
xxi. One classroom (25 seats)
xxii. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xxx. Visualization software
xxxi. Whiteboard
xxii. Internet connection

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 xii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xxi. Course file of the course will be maintained and evaluated by some senior faculty member. xxii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development xi. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xxi. A random sample from the marked papers may be evaluated by an independent senior faculty member. xxii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xxi. Department has curriculum committee that periodically review courses. xxii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Murtaza Ali Khan

Signature: *Murtaza Ali Khan* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: High Performance Computing

Course Code: 14016343-3

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: High Performance Computing 14016343-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Murtaza Ali Khan			
5. Level/year at which this course is offered: Level 2 or 3			
6. Pre-requisites for this course (if any): N/A			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

This course is a graduate level course on High Performance Computing (HPC). HPC refers to a specialized use and programming of (parallel) supercomputers, computer clusters, and everything from software to hardware to speed up computations.

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 course will teach state of the art theoretical and practical knowledge in the field of high performance computing. Students will be assigned assignments and project to implement the parallel computing techniques to get hands on experience. At the end of the course, a seminar/presentation event will take place in which students will present their course projects/research work.

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

Course Description:

This class will teach the fundamentals of High-Performance Computing (HPC). We will introduce different types of machines from the point of view of large-scale computation. This will include a study of CPU and GPU architectures, interconnects, and forms of parallel memory. Programming using MPI, OpenMP, OpenCL/CUDA will be introduced. This will address the issues such as load balancing, communication, and synchronization. This will be assignments related to parallel computing. There will be a final project at the end.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introduction to HPC	1	3
Processor architecture, Single processor performance	2	6
Shared Memory Models	1	3
Message passing and MPI programming	2	6
GPU Programming	1	3
Distributed Memory	1	3
Partitioning and Load Balancing	1	3
HPC numerical libraries and auto-tuning libraries	2	6
Virtual Lab using Microsoft Azure	3	9

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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 the fundamental of high performance computing	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Ability to apply knowledge of parallel computing to write high performance computing code	Lecture, Group discussion	Exam, HWs, Quizzes
1.3	An ability to recognize the use of parallel computing modeling methods to model real life data	Lecture, Group discussion	Exam, HWs, Quizzes
1.4	Develop ability to identify current techniques, skill, and tools necessary for the development of parallel computing solutions	Lecture, Group discussion	Exams, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Apply conceptual understanding of high performance computing principles and theories	Lecture, Project	Exam, HWs
2.2	Implement and evaluate high performance computing process, component, or program	Lecture, Case studies,	Exams, Reports

2.3	Investigate the real-world problems in the context of high performance computing and design innovative solutions	Lecture, Project	Project Report, Project presentation
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation
3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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	Use of latest high-performance computing tools	Lecture, Project	Project Report, Project presentation
4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of parallel computing systems.	Lecture, Case studies, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for a parallel computing system	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	HW 1	2	5%
2	Quiz 1	3	5%
3	HW 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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. Telea, Alexandru C. Data parallel computing: principles and practice. CRC Press, latest edition. ii. Data Visualization: Principles and Practice, Second Edition, Alexandru C. Telea, 2014, ISSN: 9781446585263 iii. High Performance Computing: Modern Systems and Practices, Thomas Sterling, Matthew Anderson, Maciej Brodowicz, 2017, ISSN:9780124201583
2. List Essential References Materials (Journals, Reports, etc.) i. Recent research papers in High Performance Computing journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. i. https://twitter.com/, #hpc ii. https://www.chpc.ac.za/
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. i. MATLAB, Tableau, SAS or other parallel computing 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. Visualization software ii. Whiteboard iii. Internet connection
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 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.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Murtaza Ali Khan

Signature: *Murtaza Ali Khan* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Introduction to Robotics

Course Code: 14016344-3

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: Introduction to Robotics 14016344-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Khaled Termisi			
5. Level/year at which this course is offered: Level 2 or 3			
6. Pre-requisites for this course (if any):N/A			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

This course provides theoretical and practical knowledge of Robotics.

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:

This course is an introduction to several core areas in robotics: kinematics, dynamics and control; motion planning; state estimation, localization and mapping; vision for robotics. Lectures on these topics will be complemented by a large practical that exercises knowledge of a cross section of these techniques in the construction of an integrated robot in the lab, motivated by a task such as robot navigation.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introduction to Robotics	1	3
Kinematics - forward and inverse	2	6
Dynamics	1	3
Control	1	3
Sensing - proprioception, etc.	2	6
Motion planning - basics and sampling-based methods	2	6
Motion planning - planning under uncertainty, etc.	2	6
State estimation, localization and mapping	1	3
Implementing SLAM; Multi-modal sensor fusion	1	3
Machine vision	1	3

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

	Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total

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	Recognize the essential of design and implementation of robotics systems.	Lecture, Small group discussion, research activities.	Exams, Homework, Quizzes, Reports, presentations
1.2	An ability to recognize the use of robotics in solving real life problems.	Lecture, Small group discussion, research activities	Exams, Quizzes, Reports, Research paper, presentations
2.0	**Cognitive Skills**		
2.1	Apply conceptual understanding of concepts, principles and theories related to robotics	Lecture, Homework, research activities	Exams, Homework, Quizzes
2.2	Design, implement and evaluate an robotics based system, process, component, or program to meet desired needs.	Lecture, Homework, research activities, case studies, Projects	Exams, Quizzes, Reports, Research paper, presentations
2.3	Investigate real world problems in the context of robotics and design innovative solutions	Lecture, Homework, research activities, case studies, Projects	Exams, Quizzes, Reports, Research paper, presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation

4.0	**Communication, Information Technology, Numerical**		
4.1	Use of latest information technologies	Project	Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1			

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	3	5%
2	Homework 1	2	5%
3	Quiz 2	7	5%
4	Homework 2	6	5%
5	Midterm Exam	8	20%
6	Quiz 3	11	5%
7	Homework 3	10	5%
9	Project	13	20%
10	Final Exam	15	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. Niku, Saeed B. "Introduction to Robotics: Analysis, Control, Applications, Hoboke" (2010). ii. Fukuda, Toshio, ed. Soft Computing for Intelligent Robotic Systems. Vol. 21. Physica, 2013.
2. List Essential References Materials (Journals, Reports, etc.) i. Recent Papers in Robotics related journals
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. iii.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. i. MATLAB, Python or similar software ii. Robotic toolkit to build simple robots

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 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.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department i. Course file of the course will be maintained and evaluated by some senior faculty member. ii. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Khaled Termisi

Signature: *Khaled Termisi* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: IoT Systems

Course Code: 14016345-3

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: IoT Systems 14016345-3		
2. Credit hours: 3		
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course Dr. Khaled Termisi		
5. Level/year at which this course is offered: Level 2 or 3		
6. Pre-requisites for this course (if any): N/A		
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	percentage?	100
b. Blended (traditional and online)	percentage?	
c. E-learning	percentage?	
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course

The course Principles and Design of the 'Internet of Things Systems' (IoT) is concerned with the emerging discipline of digitizing the physical world with wireless sensors, analyzing the sensor data to provide actionable information, and influencing the physical world via actuators, with an optional human in the loop.

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:

The course aims to deliver a sound understanding of the design and analysis of Internet of Things through lectures and practice. The lectures provide the foundational knowledge in sensors and actuators, fusion of data from multiple sensors, sensor data calibration and topics in sensor data analytics: pre-processing and extraction of features in time-series sensor data, and classification methods. The students conduct a major piece of coursework working in pairs to develop an IoT application using the Orient speck platform. Students will experience all the stages in the design and implementation of a complex system, from its specification to the demonstration of a working prototype. They will be exposed to aspects of embedded systems programming, networking algorithms, wireless protocols, user interface design, and system integration and testing.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introduction to IoT (Sensing, Actuation, Basics of Networking)	1	3
Basics of Networking, Communication Protocols and Sensor Networks	1	3
Interoperability in IoT (Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino)	2	6
Introduction to Raspberry	1	3
Implementation of IoT with Raspberry Pi	2	6
SDN for IoT	1	3

Cloud Computing	1	3
Fog Computing	1	3
Smart Cities and Smart Homes	1	3
Connected Vehicles	1	3
Smart grid	1	3
Industrial IoT	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Recognize the essential of design and implementation of AI based systems.	Lecture, discussion, research activities.	Exams, Homework, Quizzes, Reports, presentations
1.2	An ability to recognize the use of AI in solving real life problems.	Lecture, discussion, research activities	Exams, Quizzes, Reports, Research paper, presentations
2.0	**Cognitive Skills**		

2.1	Apply conceptual understanding of concepts, principles and theories related to AI	Lecture, Homework, discussion, research activities	Exams, Homework, Quizzes
2.2	Design, implement and evaluate an AI based system, process, component, or program to meet desired needs.	Lecture, Homework, discussion, research activities, case studies, Projects	Exams, Quizzes, Reports, Research paper, presentations
2.3	Investigate real world problems in the context of AI and design innovative solutions	Lecture, Homework, discussion, research activities, case studies, Projects	Exams, Quizzes, Reports, Research paper, presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
4.0	**Communication, Information Technology, Numerical**		
4.1	Use of latest information technologies	Lectures, research activities, case studies, Projects, Seminars	Exams, Homework, Quizzes
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for an intelligent system	Research activities, Projects	Reports, Research paper, Group 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	3	5%
2	Homework 1	2	5%
3	Quiz 2	7	5%
4	Homework 2	6	5%
5	Midterm Exam	8	20%
6	Quiz 3	11	5%
7	Homework 3	10	5%
9	Project	13	20%
10	Final Exam	15	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. Raj, Pethuru, and Anupama C. Raman. The Internet of Things: Enabling Technologies, Platforms, and Use Cases. CRC Press, 2017. ii. Bahga, Arshdeep, and Vijay Madisetti. Internet of Things: A hands-on approach. VPT, 2014. iii. Buyya, Rajkumar, and Amir Vahid Dastjerdi, eds. Internet of Things: Principles and paradigms. Elsevier, 2016.
2. List Essential References Materials (Journals, Reports, etc.) i. Recent Papers in IoT related journal
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
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)

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1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching 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.
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3. Procedures for Teaching Development i. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) i. A random sample from the marked papers may be evaluated by an independent senior faculty member. ii. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. i. Department has curriculum committee that periodically review courses. ii. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Khaled Termisi

Signature: *Khaled Termisi* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: IT and Entrepreneurship

Course Code: 14016346-3

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: IT and Entrepreneurship 14016346-3			
2. Credit hours: 3			
3. Program(s) in which the course is offered. Master of Science in Computer Science (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr. Sultan Almotiri			
5. Level/year at which this course is offered: level 2 or 3			
6. Pre-requisites for this course (if any): None			
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

Entrepreneurship builds new and better value chains by using innovation. Using IT can provide such innovation in the push for more efficient building models and this module illustrates the various factors needed to provide a platform for the entrepreneur

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:

The knowledge society is a driving force in creating economic growth and it is an aim of Information Systems to use IT to organize relevant information in an Entrepreneurial fashion so as to increase its value, to add more value and, by provoking innovation, to create new and superior value chains. The information lifecycle and hierarchy as well as the various types of Intellectual Property will be presented and explained. Subjects covered involve the knowledge-based view of the organization, theories of knowledge and information use as well as the role of various software systems (CRM, CMS, ERP, EDM etc) in developing supportive Information Systems and in learning and knowledge cycling. This module proceeds to explain how to develop an Information Systems strategy not only to satisfy the critical information needs, but also aims to explore the application and use of improved value chains using the concepts of corporate venturing (intrapreneurship) and Entrepreneurship (new venture creation). Participants should not only get "knowledge", but also gain an "employability benefit" that they can use in their careers as Information Systems specialists in innovative organizations and/or independent consultants or Entrepreneurs. It also introduces legal, ethical and professional aspects and hence addresses the employability of the students in their future career. Furthermore, students acquire the necessary research skills to independently carry out a research project.

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact hours

Information, learning and knowledge assets: SECI and other models.	1	3
Learning theory and technologies	1	3
The knowledge-based view of the firm	1	3
The role of Information Systems in adding efficiency, provoking innovation and creating new value chains.	1	3
Economic strategy and the strategic management of Information Systems.	2	6
Overview of Open Source tools, particularly in a setting of Boisots I-Space, and to create applications linking these.	1	3
Adding value: entrepreneurial economics as an exception to I/O economics.	1	3
Creating new vehicles for better systems (entrepreneurship and intrapreneurship).	2	6
Issues associated with creating new vehicles; Companies House, raising capital & tax issues, introduction to marketing.	2	6
An overview of Intellectual Capital (IPR); patents, design & trademarks and copyright, with a view to exploiting research results.	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	**Explain how creativity and innovation come about.**	Lecture, discussion	Exams, HWs, Quizzes
1.2	**Present the elements needed for a good business plan and apply the procedures and perspectives which are important in establishing a new venture or spin-out company.**	Lecture, discussion	Exam, HWs, Quizzes
1.3	**Identifying the role of Information Systems in creating and managing knowledge assets**	Lecture, discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	**Apply the knowledge view of the organization and the role of Information Systems in creating and managing knowledge assets, and in identifying and adding value to these.**	Lecture, Project	Exam, HWs
2.2	**Analyse and apply the principles of the most important management theories and Information Systems practice that relate to the requirements of innovative companies.**	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	**Critically discuss the most important pedagogical principles involved in learning and in e-Learning.**	Group discussion, Project	Project Report, Project 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	**Select, justify and manage an Information Systems investigation including relevant techniques and tools and full consideration of legal, professional and ethical aspects, leading it towards a successful conclusion using appropriate research methods and findings.**	Lecture, Project	Project Report, Project presentation
4.3	**To engage authentic problem solving in near-real situations**	Lecture, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for implementation of algorithms on various platforms	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	Assignment 1	2	5%
2	Quiz 1	3	5%
3	Assignment 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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)
xxiii. Office Hours for student counseling and support – Three hours/week
xxiv. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks
xvi. Mellor, R.B. (2011): Knowledge Management and Information Systems Strategy. Palgrave. ISBN: 9780230280434
xvii. Mellor, R. B. (2009): Entrepreneurship for Everyone. Sage ISBN: 1446216497
2. List Essential References Materials (Journals, Reports, etc.)
xviii.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
xiii.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
xiii.

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.)
xxiii. One classroom (25 seats)
xxiv. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xxiii. Whiteboard
xxiv. Internet connection
xxv. Smart Board
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

xiii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xxiii. Course file of the course will be maintained and evaluated by some senior faculty member. xxiv. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development xii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xxiii. A random sample from the marked papers may be evaluated by an independent senior faculty member. xxiv. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xxiii. Department has curriculum committee that periodically review courses. xxiv. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan H. almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Wireless Communication and Networks

Course Code: 14016347-3

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: Wireless Communication and Networks 14016347-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Sultan Almotiri
5. Level/year at which this course is offered: Level 2 or 3
6. Pre-requisites for this course (if any): N/A
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

The module addresses theory and practice of wireless communication systems and networks, including the most recent wireless communications standards. The first part will focus on the propagation characteristics of wireless channels and the main techniques for efficient communication, including modulation and channel coding. Characteristics and performance limits of wireless systems, techniques and tools to analyses them and methods for their design will also be covered. The second part of the module will cover real-world wireless systems and networks, including wireless broadband systems and wireless sensor networks. It will provide practical and useful knowledge that can be readily applied in the wireless industry. It covers the real-world, practical knowledge needed to understand, design, evaluate, deploy, test, validate and debug WLAN, WMAN and WPAN, as well as GPRS/ UMTS/ 3G and 4G and beyond networks and systems and Wireless Sensor Networks (WSN). Advanced technologies such as ultra-wideband communications and cognitive radio will also be addressed.

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:

The topics include system security objectives and threats, user authentication, access control, database and cloud security, denial of service, IDS, IPS, computer security models, IT security management and risk assessment, enterprise architecture security threats and preventions, security Awareness and security polices, digital crime, cybercrime.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Overview of Wireless Networks	1	3
Fundamentals of Cellular Networks	1	3
Cellular Networking (1G, 2G, GPRS, UMTS, 3G and Beyond)	2	6
Wireless Local Area Networks (WLANs)	2	6

Wireless Personal Area Networks (WPANs)	1	3
Mobile IP	2	6
Ad Hoc Networking	2	6
Wireless Sensor Networks	1	3
Wireless Mesh Networks	1	3
Delay Tolerant Networks	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	Articulate the various types of wireless/ cellular networks and the trends in wireless networking and communications	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	Estimate the path loss for free space, ground reflection and for urban area propagation, and	Lecture, Group discussion	Exam, HWs, Quizzes

	analyze and design physical layer strategies for wireless communications, including digital modulated techniques, spread spectrum, orthogonal frequency division multiplex, duplex systems, and forward error correction.		
2.0	**Cognitive Skills**		
2.1	Apply the benefits and applications for fixed and random-access techniques used for wireless networks.	Lecture, Project	Exam, HWs
2.2	Measure and critically analyses the performances of wireless communication systems (including WLANs, WMANs and WPANs) based on a range of criteria (including bit error rate and packet loss rate) and at different layers of the protocol stack.	Lecture, Case studies,	Exams, Reports
2.3	Apply different aspects, including legal and regulatory aspects, in the design, operation, and implementation of advanced wireless and mobile networks and apply the learned concepts in a laboratory environment.	Lecture, Project	Project Report, Project presentation
3.0	**Interpersonal Skills & Responsibility**		
3.1	Write succinct, accurate technical reports.	Group discussion, Project	Project Report, Project 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
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for implementation of algorithms on various platforms	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	Assignment 1	2	5%
2	Quiz 1	3	5%
3	Assignment 2	5	5%
4	Quiz 2	6	5%
5	Assignment 3	7	5%

6	Midterm Exam	9	20%
7	Project	10	15%
8	Final Exam	15	40%

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)

xxv. Office Hours for student counseling and support – Three hours/week

xxvi. Availability of teaching Staff on e-learning resources

E Learning Resources

1. List Required Textbooks

xviii. D. P. Agrawal and Q. A. Zeng, Introduction to Wireless and Mobile Systems, Third Edition, Cengage Learning, 2010, ISBN:1439062056

xix. V. K. Garg, Wireless Communications and Networking, Morgan Kaufmann, 2007, ISBN: 9780123735805.

XX. W. Stallings, Wireless Communications & Networks, international Edition, Prentice Hall, 2013, ISBN: 9781292055527

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

xix. Molisch, A. (2010), Wireless Communications, 2nd Ed, Willey. *ISBN*-10: 0470741864 | *ISBN*-13: 978-0470741863.

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

xiv.

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

xiv.

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.)

xxv. One classroom (25 seats)

xxvi. One lab (25 PCs)

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

xxvi. Whiteboard

xvii. Internet connection xviii. Smart Board
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 xiv. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xxv. Course file of the course will be maintained and evaluated by some senior faculty member. xxvi. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development xiii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xxv. A random sample from the marked papers may be evaluated by an independent senior faculty member. xxvi. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xxv. Department has curriculum committee that periodically review courses. xxvi. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri
Signature: *Sultan H. almotiri* **Date Completed:** Oct. 22, 2018
Program Coordinator: _____
Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advanced Topics in Computer Science

Course Code: 14016448-3

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: Advanced Topics in Computer Science 14016448-3
2. Credit hours: 3
3. Program(s) in which the course is offered. Master of Science in Computer Science

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Sultan Almotiri
5. Level/year at which this course is offered: level 3/ year 2
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		percentage?	100
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

Advanced topics selected from current literature that deals with theory, methods and practical to address the problems faced the real word. The specific content of an offering of the course should focus on any specific area of Computer Science

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:

The course will teach state of the art theoretical and practical knowledge in the field of Data Science. Students will be assigned assignments and project to get hands on experience. At the end of the course, a seminar/presentation event will take place in which students will present their course projects/research work.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
TBA (To Be Announced)	1-14	42

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
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	An ability to recognize the use of Cloud Computing in solving real life problems (e.g., cloud as service, cloud as storage)	Lecture, Group discussion	Exams, HWs, Quizzes
1.2	An ability to identify current techniques, skills, and tools necessary for the development of computer science related topics	Lecture, Group discussion	Exam, HWs, Quizzes
2.0	**Cognitive Skills**		
2.1	Design, implement and evaluate system, process, component, or program on Cloud	Lecture, Project	Exam, HWs
2.2	Investigate real world problems in the context of Computer Science and design innovative solutions	Lecture, Case studies,	Exams, Reports
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate own learning and professional development	Group discussion, Project	Project Report, Project presentation
3.2	Work effectively in groups to accomplish a common goal and show leadership qualities	Group discussion, Project	Project Report, Project presentation
3.3	Act ethically and responsibly with high moral standards	Lectures, discussion	Anti-plagiarism software, paper review, 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	Use of latest development tools	Lecture, Project	Project Report, Project presentation

4.3	Demonstrate the ability to use mathematical and statistical techniques in the design and analysis of algorithms.	Lecture, Case studies, Project	Exams, Project Report, Project presentation
5.0	**Psychomotor (if any)**		
5.1	Ability to operate and construct necessary tools required for computing system	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	HW 1	2	5%
2	Quiz 1	3	5%
3	HW 2	5	5%
4	Quiz 2	6	5%
5	Midterm Exam	8	20%
6	Project	10	20%
7	Final Exam	15	40%

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

E Learning Resources

1. List Required Textbooks
xii. Decided by the teacher
2. List Essential References Materials (Journals, Reports, etc.)
vii. Recent Papers in Computer Science Research
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
xiii. Springer Journal of Computer Science
xiv. IEEE Transactions on Computer Science
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
vii.

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.)
xiii. One classroom (25 seats)
xiv. One lab (25 PCs)
2. Technology resources (AV, data show, Smart Board, software, etc.)
xiii. Whiteboard
xiv. Internet connection
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
vii. At the end of semester, course evaluation forms will be filled by the students electronically or on paper. The evaluation forms will be anonymous.

2. Other Strategies for Evaluation of Teaching by the Instructor or the Department xiii. Course file of the course will be maintained and evaluated by some senior faculty member. xiv. Instructor evaluation is performed for every semester
3. Procedures for Teaching Development vii. Constant reading of new books and research papers, attending related conferences and workshops, participation in the research groups and blogs etc.
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) xiii. A random sample from the marked papers may be evaluated by an independent senior faculty member. xiv. Departmental quality assurance committee can review the students grades and course files to make sure that high standard of teaching is maintained.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. xiii. Department has curriculum committee that periodically review courses. xiv. Faculty council review offer program as per need.

Name of Course Instructor: Dr. Sultan Almotiri

Signature: *Sultan Almotiri* **Date Completed:** Oct. 22, 2018

Program Coordinator: _____

Signature: _____ **Date Received:** _____