جامعة أم القرى

كلية الحاسب الآلي ونظم المعلومات

الماجستير في علوم وهندسه الحاسب بالمقررات

والمشرع البحثي

4. Learning and Teaching

4/1 Learning Outcomes and Graduate Specifications

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

(a) Information Security

(b) Computer Networks

(c) Information Management and Decision Making

(d) Computer Vision and Graphics

(e) Software Engineering

4/1/2 Curriculum Study Plan Table:

2-year fast plan (For full-time students)

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 1	140060X-3	General Core Course 1	General Elective	Graduate Standing	3
	140061X-3	Math Core Course 1	Math Elective	Graduate Standing	3
	140061X-3	Math Core Course 2	Math Elective	Graduate Standing	3
	1400608-1	Research Seminar	Required	Graduate Standing	1
Level 2	140060X-3	General Core Course 2	General Elective	Graduate Standing	3
	14006XX-3	Track Elective Course 1	Track Elective	Graduate Standing	3
	14006XX-3	Track Elective Course 2	Track Elective	Graduate Standing	3
	1400609-2	Research Methods and Skills	Required	Graduate Standing	2
Level 3	14006XX-3	Track Elective Course 3	Track Elective	Graduate Standing	3
	14006XX-3	Track Elective Course 4	Track Elective	Graduate Standing	3
	14006XX-3	Track Elective Course 5	Track Elective	Graduate Standing	3
	1400698-6	Research Project	Required	Graduate Standing	
Level 4	14006XX-3	Track Elective Course 6	Track Elective	Graduate Standing	3
	14006XX-3	Track Elective Course 7	Track Elective	Graduate Standing	3
	1400698-6	Research Project	Required	Graduate Standing	6

4/1/2 Curriculum Study Plan Table:
4-year relaxed plan (For part-time students)

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 1	140060X-3	General Core Course 1	General Elective	Graduate Standing	3
	140061X-3	Math Core Course 1	Math Elective	Graduate Standing	3
Level 2	140060X-3	General Core Course 2	General Elective	Graduate Standing	3
	140061X-3	Math Core Course 2	Math Elective	Graduate Standing	3
Level 3	1400608-1	Research Seminar	Required	Graduate Standing	1
	1400609-2	Research Methods and Skills	Required	Graduate Standing	2
	14006XX-3	Track Elective Course 1	Track Elective	Graduate Standing	3
Level 4	14006XX-3	Track Elective Course 2	Track Elective	Graduate Standing	3
	14006XX-3	Track Elective Course 3	Track Elective	Graduate Standing	3
Level 5	14006XX-3	Track Elective Course 4	Track Elective	Graduate Standing	3
	14006XX-3	Track Elective Course 5	Track Elective	Graduate Standing	3
Level 6	14006XX-3	Track Elective Course 6	Track Elective	Graduate Standing	3
	14006XX-3	Track Elective Course 7	Track Elective	Graduate Standing	3
Level 7	1400698-6	Research Project	Required	Graduate Standing	
Level 8	1400698-6	Research Project	Required	Graduate Standing	6

Course List and Categories

Category	Course Code	Course Title
General Core Courses (General Electives)	1400601-3	Operating Systems
	1400602-3	Design and Analysis of Algorithms
	1400603-3	Computer Architecture
	1400604-3	Modeling and Simulation
	1400605-3	Software Design and Development
	1400606-3	Distributed Systems
Math Core Courses (Math Electives)	1400610-3	Engineering Optimization
	1400611-3	Random Variables and Stochastic Processes
	1400612-3	Advanced Engineering Mathematics
	1400619-3	Special Topics in Mathematics
Track Elective Courses – Information Security Track	1400620-3	Information Security
	1400621-3	Cryptography
	1400622-3	Software Security
	1400623-3	Digital Forensics
	1400624-3	Network Security
	1400625-3	Database Security
	1400626-3	Embedded Systems Security
	1400627-3	Ethical Hacking
	1400629-3	Special Topics in Information Security
Track Elective Courses – Computer Networks Track	1400630-3	Advanced Computer Networks
	1400631-3	Network Programming and Management
	1400632-3	Adhoc and Sensor Networks
	1400633-3	Modeling and Analysis of Computer Networks
	1400634-3	Mobile and Wireless Communication Systems
	1400635-3	Internet of Things
	1400636-3	Optical Networking
	1400639-3	Special Topics in Computer Networks

Track Elective Courses – Information Management and Decision Making Track	1400640-3	Database and Information Management
	1400641-3	Distributed Database Systems
	1400642-3	Machine Learning
	1400643-3	Multimedia Database
	1400644-3	Information Retrieval
	1400645-3	Big Data Analytics
	1400646-3	Collective Decision Making
	1400647-3	Computational Social Choice
	1400648-3	Data Mining
	1400649-3	Special Topics in Information Management and Decision Making
Track Elective Courses – Computer Vision and Graphics Track	1400650-3	Image Processing
	1400651-3	Computer Graphics
	1400652-3	Computer Vision
	1400653-3	Computational Geometry
	1400654-3	Visualization
	1400655-3	Pattern Recognition
	1400659-3	Special Topics in Computer Vision and Graphics
Track Elective Courses – Software Engineering Track	1400660-3	Advanced Software Engineering
	1400661-3	Software Testing and Quality Assurance
	1400662-3	Software Architecture
	1400663-3	Service Oriented Architecture
	1400664-3	Software Project Management
	1400665-3	Mobile Application Development
	1400666-3	Web Application Development
	1400667-3	Geographical information Systems
	1400668-3	Design Patterns
	1400669-3	Special Topics in Software Engineering
Track Elective Courses – Any Track	1400696-3	Directed Study I
	1400697-3	Directed Study II

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Operating Systems

Course Code: 1400601-3

Date: **1/11/2018.**	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Operating Systems – (1400601-3)			
2. Credit hours: 3			
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering			
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.			
5. Level/year at which this course is offered: Year 1 or 2			
6. Pre-requisites for this course (if any): Graduate Standing			
7. Co-requisites for this course (if any): N/A			
8. Location if not on main campus: Male/Female Campus			
9. Mode of Instruction (mark all that apply):			
a. Traditional classroom	X	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: Review fundamental knowledge in operating systems. Thereafter, discuss advanced topics in multiprocessing, networked, distributed, real-time, and special-purpose operating 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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Process and thread models, creation, management, scheduling, and termination
- Resource sharing, context switching, and deadlock
- Thread coordination, Inter-process communication, messages, synchronization paradigms, priority, one-to-many communication
- Address space and low level memory management, stack and heap segments, hardware support
- Virtual memory concepts, segmentation and paging, hardware support
- Device independent I/O, generic device interface, interrupt, and exception handling
- File systems, disk model, separation of naming/indexing/access mechanisms, protection
- Real time issues and real time processing
- Multiprogramming systems, networked and distributed operating systems, embedded systems operating systems, and special-purpose operating systems
- Operating system-level virtualization and virtual machines

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines and Introduction	1	3
Review of previous operating systems principles	1	3
Process and thread models, creation, management, scheduling, and termination	1	3
Resource sharing, context switching, and deadlock	1	3
Thread coordination, Inter-process communication, messages, synchronization paradigms, priority, one-to-many communication	1	3
Address space and low level memory management, stack and heap segments, hardware support	1	3
Virtual memory concepts, segmentation and paging, hardware support	1	3
Midterm Review and Exam,	1	3

Device independent I/O, generic device interface, interrupt, and exception handling	1	3
File systems, disk model, separation of naming/indexing/access mechanisms, protection	1	3
Real time issues and real time processing	1	3
Multiprogramming systems, networked and distributed operating systems, embedded systems operation systems, and special-purpose operating systems	2	6
Operating system-level virtualization and virtual machines	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

3

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 thorough knowledge and critical understanding of the main areas of the field of computer science and engineering	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
2.0	**Cognitive Skills**		
2.3	Make informed and defensible judgments in circumstances where there is an absence of complete or consistent information	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
3.0	**Interpersonal Skills & Responsibility**		

3.3	Take initiative in identifying and responding creatively to complex issues and problems in an academic or professional context	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Andrew S. Tanenbaum, Herbert Bos, “Modern Operating Systems”, 4th Edition, Pearson, 2014.
- Dorren L. Galli, “Distributed Operating Systems - Concepts & Practice”, Prentice Hall, 1999
- Abraham Silberschatz, “Operating System Concepts”, 10th Edition, Wiley, 2018

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Design and Analysis of Algorithms

Course Code: 1400602-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Design and Analysis of Algorithms – (1400602-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1 or 2
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Review fundamental knowledge regarding the design and performance analysis of regular as well as recursive computer algorithms. Emphasize some important classes of problems. Thereafter, introduce advanced topics within the field.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Upper and lower bounds on time and space complexity
- Techniques for designing algorithms: like dynamic programming, divide and conquer, greedy, and balancing
- A selection of applications such as disjoint set union/find, graph algorithms, search trees, pattern matching, geometric algorithms
- The polynomial complexity classes P, NP, and co-NP; intractable problems
- Approximation algorithms and randomized algorithms

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of basic concepts	1	3
Upper and lower bounds on time and space complexity	2	6
Techniques for designing algorithms: like dynamic programming, divide and conquer, greedy, and balancing	3	9
A selection of applications such as disjoint set union/find, graph algorithms, search trees, pattern matching, geometric algorithms	3	9
Midterm Review and Exam,	1	3
The polynomial complexity classes P, NP, and co-NP; intractable problems	2	6
Approximation algorithms and randomized algorithms	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3

	Actual						

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

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 thorough knowledge and critical understanding of the main areas of the field of computer science and engineering	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
2.0	**Cognitive Skills**		
2.3	Make informed and defensible judgments in circumstances where there is an absence of complete or consistent information	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
3.0	**Interpersonal Skills & Responsibility**		
3.3	Take initiative in identifying and responding creatively to complex issues and problems in an academic or professional context	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, The MIT Press, 2009. - Steven S Skiena , "The Algorithm Design Manual", 2nd Edition, Springer, 2010
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: _______________________ **Date Received:** ______________

4/1/4. Course Specification:

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COURSE SPECIFICATIONS
Form

Course Title: Computer Architecture

Course Code: 1400603-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Computer Architecture – (1400603-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1 or 2
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Review fundamental knowledge of computer architecture and instruction-level parallelism. Thereafter, discuss advanced computer architecture topics, like multicore architecture, memory organization, cache coherence, SIMD architecture, and special-purpose hardware accelerators.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Calculating the Performance and the speedup of new architectures
- Instruction-level parallelism techniques, like pipelining, superscalar, branch prediction, VLIW, and multiple issue
- Thread-level parallelism: architectures, and cache coherence
- SIMD architectures, like vector processors and GPUs
- Special-purpose hardware accelerators

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of basic concepts	1	3
Calculating the Performance and the speedup of new architectures	1	3
Instruction-level parallelism techniques, like pipelining, superscalar, branch prediction, VLIW, and multiple issue	3	9
Thread-level parallelism: architectures, and cache coherence	3	9
Midterm Review and Exam,	1	3
SIMD architectures, like vector processors and GPUs	3	9
Special-purpose hardware accelerators	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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 thorough knowledge and critical understanding of the main areas of the field of computer science and engineering	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
2.0	**Cognitive Skills**		
2.3	Make informed and defensible judgments in circumstances where there is an absence of complete or consistent information	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
3.0	**Interpersonal Skills & Responsibility**		
3.3	Take initiative in identifying and responding creatively to complex issues and problems in an academic or professional context	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - John Hennessy David Patterson , “Computer Architecture, A Quantitative Approach”, 6th Edition, Morgan Kaufmann, 2017
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Modeling and Simulation

Course Code: 1400604-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Modeling and Simulation – (1400604-3)			
2. Credit hours: 3			
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering			
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.			
5. Level/year at which this course is offered: Year 1 or 2			
6. Pre-requisites for this course (if any): Graduate Standing			
7. Co-requisites for this course (if any): N/A			
8. Location if not on main campus: Male/Female Campus			
9. Mode of Instruction (mark all that apply):			
a. Traditional classroom	X	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: Prepare students to design, develop, implement, and analyze models as well as simulations of real computer-based systems. Provide students with hand-on experience of simulation tools and languages.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Performance measures
- Modeling methodologies: queuing models, graph models, dataflow models, and Petrinet models
- Mathematical models of computer systems: CPU and computer subsystems such as memory, I/O, and disks
- Bottleneck analysis
- Modeling multi-server systems
- Model validation methods
- Random Number generation
- Computer simulation of real systems: languages, tools, and methodologies

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of basic concepts	1	3
Performance measures	1	3
Modeling methodologies: queuing models, graph models, dataflow models, and Petrinet models	3	9
Mathematical models of computer systems: CPU and computer subsystems such as memory, I/O, and disks	2	6
Midterm Review and Exam	1	3
Bottleneck analysis	1	3
Modeling multi-server systems	1	3
Model validation methods	1	3
Random Number generation	1	3
Computer simulation of real systems: languages, tools, and methodologies	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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 thorough knowledge and critical understanding of the main areas of the field of computer science and engineering	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
2.0	**Cognitive Skills**		
2.3	Make informed and defensible judgments in circumstances where there is an absence of complete or consistent information	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
3.0	**Interpersonal Skills & Responsibility**		
3.3	Take initiative in identifying and responding creatively to complex issues and problems in an academic or professional context	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%

2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Averill M. Law, "Simulation Modeling and Analysis" 5th Edition, McGraw-Hill, 2014.
- Jerry Banks, John S. Carson, Barry L. Nelson, David M. Nicol, "Discrete-Event System Simulation' 5th Edition, Pearson, 2009.
- Jerry Banks, "Handbook of Simulation: Principles, Methodology, Advances, Applications, and Practice", Wiley, 1998.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio

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

Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Software Design and Development

Course Code: 1400605-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Software Design and Development – (1400605-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1 or 2
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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 is intended to extend the student's knowledge to encompass a number of important programming techniques necessary for building a modern computing application.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

The course content will include techniques in Java to deal with a range of issues drawn from the following: program design using an object oriented programming model; modelling data using programming language type systems; event and exception programming; providing a graphical user interface; thread programming; persistence; and distributed programming. It will also cover in brief the underlying Java run time system and techniques found in other languages.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of basic concepts	1	4
Program design using an object oriented programming model;	1	4
Modelling data using programming language type systems	1	4
Event and exception programming	1	4
graphical user interface	2	8
thread programming	2	8
Midterm Review and Exam	1	4
persistence and distributed programming	2	8
Collection frameworks and Data Structures	2	8
Standards and Best Practice Guides: ISO 27001, ISO 27014, BSSIM SSF.	1	4
Revision	1	4

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	30	---	---	30	---	60
	Actual						
Credit	Planned	2	---	---	1	---	3
	Actual						

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

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 thorough knowledge and critical understanding of the main areas of the field of computer science and engineering	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
2.0	**Cognitive Skills**		
2.3	Make informed and defensible judgments in circumstances where there is an absence of complete or consistent information	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
3.0	**Interpersonal Skills & Responsibility**		
3.3	Take initiative in identifying and responding creatively to complex issues and problems in an academic or professional context	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	40%
2	Midterm Exam	8-10	20%
3	Practical and Lab work	1-15	20%
4	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Y. Daniel Liang, "Introduction to Java Programming and Data Structures", 11th Edition, Pearson, 2017. - Cay S. Horstmann, "Big Java: Late Objects", Wiley, 2014. - by Walter Savitch (Author), Kenrick Mock, "Absolute Java", 6th Edition, Pearson, 2015 - Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Java", 6th Edition, Wiley, 2014. - Paul J. Deitel, Harvey Deitel, "Java: How to Program, Late Objects", 10th Edition, Pearson, 2017. - Ian Sommerville, "Software Engineering", 10th Edition, Pearson, 2015.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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. 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.) - Ordinary classroom or video conference studio - Laboratory with about 25 PCs
2. Technology resources (AV, data show, Smart Board, software, etc.)

Datashow, PC/Laptop with a presentation software installed, ordinary while board, and 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ Date Completed: ___________

Program Coordinator: ____

Signature: ________________________ Date Received: _______________

4/1/4. Course Specification:

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COURSE SPECIFICATIONS

Form

Course Title: Distributed Systems

Course Code: 1400606-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Distributed Systems – (1400606-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1 or 2
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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
Course Outlines, introduction to parallel and distributed systems, and review of basic concepts	1	3
Hardware architectures (multiprocessors, clusters, etc.)	1	3
Concurrency and synchronization	2	6
Data and work partitioning	2	6
Granularity	1	3
Midterm Review and Exam,	1	3
Load balancing	2	6
P-Threads, Locks and semaphores	2	6
MPI, MapReduce and Hadoop	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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 thorough knowledge and critical understanding of the main areas of the field of computer science and engineering	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
2.0	**Cognitive Skills**		
2.3	Make informed and defensible judgments in circumstances where there is an absence of complete or consistent information	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
3.0	**Interpersonal Skills & Responsibility**		
3.3	Take initiative in identifying and responding creatively to complex issues and problems in an academic or professional context	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Ajay D. Kshemkalyani, “Distributed Computing: Principles, Algorithms, and Systems”, Cambridge University Press, 2011. - Nicola Santoro, “Design and Analysis of Distributed Algorithms”, Wiley-Interscience, 2006.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Research Seminar

Course Code: 1400608-1

Date: 1/11/2018.	**Institution**: Umm Al–Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Research Seminar – (1400608-1)			
2. Credit hours: 1			
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering			
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.			
5. Level/year at which this course is offered: Year 1 or 2			
6. Pre-requisites for this course (if any): Graduate Standing			
7. Co-requisites for this course (if any): N/A			
8. Location if not on main campus: Male/Female Campus			
9. Mode of Instruction (mark all that apply):			
a. Traditional classroom	X	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: Allow students to interact and learn from latest research trends in computing field from Researchers in the college and guest speakers. Moreover, give students the opportunity to practise doing presentations in their areas of interest

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Presentation preparation and delivery, presentation skills
- Invited talks from researchers/experts in the area, with and from outside the university
- Student presentation: each student is required to make one presentation and attend all scheduled presentations by his/her peers.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines and Introduction	1	3
Presentation preparation and delivery, presentation skills	2	6
Invited talks from researchers/experts in the area, with and from outside the university	7-9	21-27
Student presentation: each student is required to make one presentation and attend all scheduled presentations by his/her peers.	3-5	9-15

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	1	---	---	---	---	1
	Actual						

3. Individual study/learning hours expected for students per week. 1

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**		
1.3	Understand how new knowledge is developed and applied	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, and Anti plagiarism software
2.0	**Cognitive Skills**		
2.2	Can independently plan and execute a major project or piece of scholarly research applying practical and theoretical knowledge and research techniques and producing sound conclusions	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, and Anti plagiarism software
3.0	**Interpersonal Skills & Responsibility**		
3.2	Deal consistently and sensitively with complex ethical issues in academic and or professional contexts	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, and Anti plagiarism software
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively through informal and formal reports, presentations, and publications	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, and Anti plagiarism software

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	Student Presentations	11-15	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester

2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary presentations are attended and their evaluations are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Research Methods and Skills

Course Code: 1400609-2

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Research Methods and Skills – (1400609-2)
2. Credit hours: 2
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1 or 2
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Provide students with basic skills to conduct research. This spans a wide area from selecting the research point till the completion of the associated research articles, like thesis and papers

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Selection of research point and title
- Doing Literature survey
- Using digital research libraries
- Preparing research proposals
- Thesis and papers writing
- Design of experiments and interpretation of results
- Statistical analysis of data
- Helpful tools and software packages
- Mini projects by students

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines and Introduction	1	3
Selection of research point and title	1	3
Doing Literature survey	1	3
Using digital research libraries	1	3
Preparing research proposals	1	3
Thesis and papers writing	2	6
Design of experiments and interpretation of results	1	3
Statistical analysis of data	1	3
Helpful tools and software packages	2	6
Mini projects by students	4	12

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	2	---	---	---	---	2

	Actual						

3. Individual study/learning hours expected for students per week.	2

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**		
1.3	Understand how new knowledge is developed and applied	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, and Anti plagiarism software
2.0	**Cognitive Skills**		
2.2	Can independently plan and execute a major project or piece of scholarly research applying practical and theoretical knowledge and research techniques and producing sound conclusions	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, and Anti plagiarism software
3.0	**Interpersonal Skills & Responsibility**		
3.2	Deal consistently and sensitively with complex ethical issues in academic and or professional contexts	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, and Anti plagiarism software
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively through informal and formal reports, presentations, and publications	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, and Anti plagiarism software

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	Student mini projects	12-15	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - James H. Cauraugh, "Research Methods: Functional Skills, 2nd Edition, Telemachus Press, 2012.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary samples from students mini projects are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ Date Completed: ___________

Program Coordinator: ____

Signature: ________________________ Date Received: _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Engineering Optimization

Course Code: 1400610-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Engineering Optimization – (1400610-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1 or 2
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Study different methods for formulating and solving optimization problems in science and engineering. This includes linear, non-linear, constrained, non-constrained, and global optimization problems

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- The steepest descent and Newton's method for nonlinear equations and unconstrained optimization
- Conjugate and quasi-Newton methods.
- Simplex and interior-point methods for linear programming
- Equality and inequality-constrained optimization
- Sequential, Active-set methods, and primal-dual interior-point methods for quadratic and convex programming
- Sequential quadratic programming and interior-point methods for nonconvex optimization
- Discrete optimization
- Evolutionary Algorithms (EA)-based optimization techniques

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of basic concepts	1	3
The steepest descent and Newton's method for nonlinear equations and unconstrained optimization	2	6
Conjugate and quasi-Newton methods	1	3
Simplex and interior-point methods for linear programming	2	6
Equality and inequality-constrained optimization	1	3
Midterm Review and Exam	1	3
Sequential, Active-set methods, and primal-dual interior-point methods for quadratic and convex programming	2	6
Sequential quadratic programming and interior-point methods for nonconvex optimization	1	3
Discrete optimization	1	3
Introduction to metaheuristics optimization techniques	2	6
Revision	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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 thorough knowledge and critical understanding of the main areas of the field of computer science and engineering	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
2.0	**Cognitive Skills**		
2.3	Make informed and defensible judgments in circumstances where there is an absence of complete or consistent information	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
3.0	**Interpersonal Skills & Responsibility**		
3.3	Take initiative in identifying and responding creatively to complex issues and problems in an academic or professional context	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
4.0	**Communication, Information Technology, Numerical**		
4.2	Obtain, critically evaluate, and make effective use of mathematical and statistical data	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports

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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Singiresu S. Rao, "*Engineering Optimization: Theory and Practice",* 4th Edition, Wiley, 2009.
- Andreas Antoniou, Wu-Sheng Lu, "Practical Optimization, Algorithms and Engineering Applications", Springer, 2007.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio

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

Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Random Variables and Stochastic Processes

Course Code: 1400611-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Random Variables and Stochastic Processes – (1400611-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1 or 2
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Provide fundamental knowledge of random variables, queuing theory, and different stochastic processes, specially Markovian ones.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Random variables, transformation of functions of random variables
- Random processes: correlation and power spectral density
- Markov chains, transition matrix, transition probabilities, and classification of chains
- Markov processes, Poisson process, birth-death process and applications to queues, Polya process, branching processes, and stationary process
- queuing theory, simple Markovian queues, networks of queues, general single and multiple server queues, bounds and approximations

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of basic concepts	1	3
Random variables, transformation of functions of random variables	1	3
Random processes: correlation and power spectral density	1	3
Markov chains, transition matrix, transition probabilities, and classification of chains	2	6
Markov processes, Poisson process, birth-death process and applications to queues, Polya process, branching processes, and stationary process	4	12
Midterm Review and Exam	1	3
queuing theory, simple Markovian queues, networks of queues, general single and multiple server queues, bounds and approximations	4	12
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						

Credit	Planned	3	---	---	---	---	3
	Actual						

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

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 thorough knowledge and critical understanding of the main areas of the field of computer science and engineering	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
2.0	**Cognitive Skills**		
2.3	Make informed and defensible judgments in circumstances where there is an absence of complete or consistent information	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
3.0	**Interpersonal Skills & Responsibility**		
3.3	Take initiative in identifying and responding creatively to complex issues and problems in an academic or professional context	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
4.0	**Communication, Information Technology, Numerical**		
4.2	Obtain, critically evaluate, and make effective use of mathematical and statistical data	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports

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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", 4^{th} Edition, McGraw-Hill, 2002.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: __________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advanced Engineering Mathematics

Course Code: 1400612-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Advanced Engineering Mathematics – (1400612-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1 or 2
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Provide essential knowledge of different mathematical areas, which are needed for successful research. These areas include series, numerical analysis techniques, differential equations, matrix operations, and different transformation 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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Finite and infinite series
- Laplace transforms (Laplace, Fourier, and Z transforms)
- Partial differential equations
- Non-linear differential equations
- Matrix operations and manipulation
- Numerical Analysis techniques (algebraic equations, systms of linear equtions, interpolation, differential, differential equations, and integration)
- Computer implementation of algorithms

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of basic concepts	1	3
Finite and infinite series	2	6
Transforms (Laplace, Fourier, and Z transforms)	2	6
Differential equations, Partial differential equations	3	9
Midterm Review and Exam	1	3
Matrix operations and manipulation	2	6
Numerical Analysis techniques (algebraic equations, systms of linear equtions, interpolation, differential, differential equations, and integration)	2	6
Computer implementation of algorithms	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						

Credit	Planned	3	---	---	---	---	3
	Actual						

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

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 thorough knowledge and critical understanding of the main areas of the field of computer science and engineering	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
2.0	**Cognitive Skills**		
2.3	Make informed and defensible judgments in circumstances where there is an absence of complete or consistent information	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
3.0	**Interpersonal Skills & Responsibility**		
3.3	Take initiative in identifying and responding creatively to complex issues and problems in an academic or professional context	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
4.0	**Communication, Information Technology, Numerical**		
4.2	Obtain, critically evaluate, and make effective use of mathematical and statistical data	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports

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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Willey, 2011. - Dennis Zill, "Advanced Engineering Mathematics", 6th Edition, Jones & Bartlett Learning, 2016. - Canale Chapra, "Numerical Methods For Engineers", 7th Edition, McGraw-Hill, 2016.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Special Topics in Mathematics

Course Code: 1400619-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Special Topics in Mathematics – (1400619-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Discuss new topics which are selected from current literature in the field of mathematics and are essential for students to conduct their research. One or more areas within the field will be explored in details.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description: This course is intended to teach modern theory and practices in the field of mathematics. The course would have assignments and project for students to get hands on experience. Students should provide their findings through oral presentation and in writing.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
To be decided by the course instructor (TBD)	1-15	45

2. Course components (total contact and credit hours per semester):							
		Lecture	**Tutorial**	**Laboratory/ Studio**	**Practical**	**Other**	**Total**
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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 thorough knowledge and critical understanding of the main areas of the field of computer science and engineering	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
2.0	**Cognitive Skills**		
2.3	Make informed and defensible judgments in circumstances where there is an absence of complete or consistent information	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
3.0	**Interpersonal Skills & Responsibility**		
3.3	Take initiative in identifying and responding creatively to complex issues and problems in an academic or professional context	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
4.0	**Communication, Information Technology, Numerical**		
4.2	Obtain, critically evaluate, and make effective use of mathematical and statistical data	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports

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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - To be decided by the course instructor
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.

3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples, presentation, and projects are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ **Date Completed: ___________**

Program Coordinator: ____

Signature: ________________________ **Date Received: _______________**

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Information Security

Course Code: 1400620-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Information Security – (1400620-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Discuss the fundamentals and basics of information security, like confidentiality, integrity, access control, and availability.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Introduction and fundamental concepts of information security.
- Types of security: such as physical security, computer security, and network security
- Security services and mechanisms to implement them: such as confidentiality, authentication, integrity, non-repudiation, access control, and availability
- Organizational policies
- Threats and attacks against information systems: such as accidental damage, identity theft, malicious software, and "spam"
- Defensive measures

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction and fundamental concepts of information security	1	3
Types of security: such as physical security, computer security, and network security	2	6
Security services and mechanisms to implement them: such as confidentiality, authentication, integrity, non-repudiation, access control, and availability	3	9
Organizational policies	2	6
Midterm Review and Exam	1	3
Threats and attacks against information systems: such as accidental damage, identity theft, malicious software, and "spam"	3	9
Defensive measures	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						

Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Jason Andress, “The basics of information security: Understanding the Fundamentals of InfoSec in Theory and Practice”, 2nd Edition, Syngress, 2014. - Mark Stamp, “Information Security: Principles and Practice”, 2nd Edition, Wiley, 2011.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: ________________________ **Date Received:** _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Cryptography

Course Code: 1400621-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Cryptography – (1400621-3)

2. Credit hours: 3

3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering

4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.

5. Level/year at which this course is offered: Year 1, 2 or 3

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

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

8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Introduce the basic concepts of cryptography. Various cipher systems are presented. Case studies of using cryptographic methods in communication systems are presented with some consideration given to privacy issues.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Historical Overview of Cryptography
- Privacy and Cryptography
- Mathematical Overview
- Transposition and Substitution Ciphers
- Rotor Machine and Poly-alphabetic Ciphers
- Block Ciphers: DES, AES
- Public Key Systems
- Knapsack System, The Knapsack System Bites the Dust
- RSA System
- Key Management
- Digital Signatures and Authentication
- Stream Ciphers
- Linear Shift Registers, Non-Linear Shift Register

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction, and Historical Overview of Cryptography	1	3
Privacy and Cryptography	1	3
Mathematical Overview	1	3
Transposition and Substitution Ciphers	1	3
Rotor Machine and Poly-alphabetic Ciphers	1	3
Block Ciphers: DES, AES	1	3
Public Key Systems	1	3
Knapsack System, The Knapsack System Bites the Dust	1	3
RSA System	1	3
Midterm Review and Exam	1	3
Key Management	1	3
Digital Signatures and Authentication	1	3

Stream Ciphers	1	3
Linear Shift Registers, Non-Linear Shift Register	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Christof Paar, Jan Pelzl, "Understanding Cryptography: A Textbook for Students and Practitioners", Springer, 2010.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio

2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Software Security

Course Code: 1400622-3

Date: 1/11/2018.	**Institution**: Umm Al–Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Software Security – (1400622-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Discuss the construction of software systems that are resistant to vulnerabilities and attacks. Security measures through the entire software life cycle is investigated in details

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Secure software development lifecycle: security requirements during analysis, design, coding, review, and testing
- Vulnerabilities in source code
- Analysis of software based attacks and defenses, timing attacks and leakage of information
- Stack and heap buffer overflows
- Case studies: construction of secure and safe Unix programs
- Secure web application development with consideration for SQL injection, cookies, and forceful browsing
- Techniques for software protection, such as code obfuscation, tamper-proofing, and water-marking
- Safety and capability systems

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of basic concepts	1	3
Secure software development lifecycle: security requirements during analysis, design, coding, review, and testing	2	6
Vulnerabilities in source code	1	3
Analysis of software based attacks and defenses, timing attacks and leakage of information	2	6
Stack and heap buffer overflows	1	3
Case studies: construction of secure and safe Unix programs	1	3
Midterm Review and Exam	1	3
Secure web application development with consideration for SQL injection, cookies, and forceful browsing	2	6
Techniques for software protection, such as code obfuscation, tamper-proofing, and water-marking	2	6
Safety and capability systems	1	3
Revision	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Mark S. Merkow and Lakshmikanth Raghavan, “Secure and Resilient Software Development”, Auerbach Publications, 2010.
- Mark Dowd, John McDonald, and Justin Schuh, “The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities”, Addison-Wesley Professional, 2006.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio

2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Digital Forensics

Course Code: 1400623-3

Date: 1/11/2018.	**Institution**: Umm Al–Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Digital Forensics – (1400623-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Demonstrate a working knowledge of basic computer forensics applications and tools; understand the fundamentals and basic principles of computer forensics and crime scene analysis; and apply the principles and procedures of computer forensics.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Introduction to Cyber Forensics, Criminalities
- Disk Structures/Controlled Boot Environment
- Bag and Tag
- Search and Seizure: Legal Rules
- Evidence Acquisition
- Media Analysis
- File systems
- Data Hiding
- Network Forensics and Mobile devices Forensics
- Mac Forensics
- HFS Plus
- Audit/logging and date archival practices
- Anti-Forensics
- Prevention, detection, apprehension, and prosecution of security violators and cyber criminals

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction to Cyber Forensics, Criminalities	1	3
Disk Structures/Controlled Boot Environment	1	3
Bag and Tag	1	3
Search and Seizure: Legal Rules	1	3
Evidence Acquisition	1	3
Media Analysis	1	3
File systems, Data Hiding	1	3
Midterm Review and Exam	1	3
Network Forensics, Mobile Devices Forensics	1	3
Mac Forensics	1	3
HFS Plus	1	3
Audit/logging and date archival practices	1	3

Anti-Forensics	1	3
Prevention, detection, apprehension, and prosecution of security violators and cyber criminals	1	3
Revision	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- André Årnes, "Digital Forensics", Wiley, 2017.
- Marie-Helen Maras, "Computer Forensics: Cybercriminals, Laws, and Evidence", 2nd Edition, Jones & Bartlett Learning, 2014.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Network Security

Course Code: 1400624-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Network Security – (1400624-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Provide a broad introduction to host-based and Internet-based computer security. The course discusses issues related to the security of network infrastructure and network applications. It covers firewalls, VPNs, intrusion detection systems, and different network security protocols. It also discusses various auditing and penetration 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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Introduction to network security
- Web security
- Security standards, SSL/TLS and SET
- Intruders and viruses
- PGP and MIME for electronic mail security
- Firewalls and VPNs
- Secret Key and Public/Private Key Cryptography
- Cryptographic Hashes and Message Digests
- Authentication Systems (Kerberos)
- Digital signatures and certificates, Kerberos and X.509v3 digital certificates
- Wireless security

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction to network security	1	3
Web security	1	3
Security standards, SSL/TLS and SET	1	3
Intruders and viruses	1	3
PGP and MIME for electronic mail security	1	3
Firewalls and VPNs	2	6
Secret Key and Public/Private Key Cryptography	1	3
Midterm Review and Exam	1	3
Cryptographic Hashes and Message Digests	1	3
Authentication Systems (Kerberos)	1	3
Digital signatures and certificates, Kerberos and X.509v3 digital certificates	1	3
Wireless network security	2	6
Revision	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%

2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Eric Maiwald, "Fundamentals of Network Security", McGraw-Hill, 2004.
- William Stallings, "Cryptography and Network Security", 7th Edition, Pearson, 2018.
- Matt Bishop, "Computer Security: Art and Science", 2nd Edition, Addison-Wesley, 2018.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio

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

Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Database Security

Course Code: 1400625-3

Date: 1/11/2018.	**Institution**: Umm Al–Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Database Security– (1400625-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Study database security and auditing issues. Moreover, investigate challenges and protection methods that ensure secure database 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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Introduction to database security and auditing issues
- Security threats to database systems
- Authentication methods
- Authorization based on privileges, roles, profiles, and resource limitations, and role-based authorization constraints
- Access control mechanisms for current DBMSs, content-based and fine-grained access control, access control systems for object-based design and XML
- Web-based databases, and data inference problem
- Data confidentiality and privacy for databases, confidentiality versus availability and integrity
- Secure statistical databases
- Integrating databases and applications security
- Security implementation and administration
- Multilevel security and integrity
- Formal models of multilevel security

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction to database security and auditing issues	1	3
Security threats to database systems	1	3
Authentication methods	1	3
Authorization based on privileges, roles, profiles, and resource limitations, and role-based authorization constraints	1	3
Access control mechanisms for current DBMSs, content-based and fine-grained access control, access control systems for object-based design and XML	2	6
Web-based databases, and data inference problem	1	3
Data confidentiality and privacy for databases, confidentiality versus availability and integrity	1	3

Midterm Review and Exam	1	3
Secure statistical databases	1	3
Integrating databases and applications security	1	3
Security implementation and administration	1	3
Multilevel security and integrity	1	3
Formal models of multilevel security	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		

4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Ron Ben Natan, "Implementing Database Security and Auditing", Digital Press, 2005.
- Hassan A. Afyouni, "Database Security and Auditing: Protecting Data Integrity and Accessibility", Cengage Learning, 2005.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.) Ordinary classroom or video conference studi
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Embedded Systems Security

Course Code: 1400626-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Embedded Systems Security– (1400626-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Study of various security models and techniques for embedded systems. Moreover, investigate hardware, firmware, and software measures that ensure a secure embedded 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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Introduction to embedded systems security
- Types of embedded systems attacks and threats
- Secure embedded software development
- Cryptographic hardware
- Side channel attacks
- Protection protocols for embedded systems
- Memory integrity
- RFID security: attack models(power analysis, side channel, and timing attacks), security techniques
- Wireless sensor networks security: key management techniques, attack models, detection and prevention techniques
- Embedded medical systems (eHealth) security
- System-on-chip security
- FPGA security

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction to embedded systems security	1	3
Types of embedded systems attacks and threats	1	3
Secure embedded software development	1	3
Cryptographic hardware	2	6
Side channel attacks	1	3
Protection protocols for embedded systems	1	3
Memory integrity	1	3
Midterm Review and Exam	1	3
RFID security: attack models(power analysis, side channel, and timing attacks), security techniques	1	3
Wireless sensor networks security: key management techniques, attack models, detection and prevention techniques	1	3
Embedded medical systems (eHealth) security	1	3

System-on-chip security	1	3
FPGA security	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

3

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- David Kleidermacher, Mike Kleidermacher, "Embedded Systems Security: Practical Methods for Safe and Secure Software and Systems Development", Newnes, 2012.
- Mohammed Tehranipoor, Cliff Wang (Eds), "Introduction to Hardware Security and Trust", Springer, 2011.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Ethical Hacking

Course Code: 1400627-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Ethical Hacking– (1400627-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Study fundamental principles and techniques of ethical hacking. Students would learn how hackers attack computers and networks, and how to protect them against these attacks. Students would also get hand-on experience through multiple assignments and mini 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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Introduction to ethical hacking and code of ethics
- Penetration testing life cycle
- Footprinting and Social Engineering
- Port Scanning
- Microsoft Operating System Vulnerabilities
- Linux Operating System Vulnerabilities
- Hacking Web Servers
- Hacking Wireless Networks
- Hacking Mobile Applications

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction to ethical hacking and code of ethics	1	3
Penetration testing life cycle	2	6
Footprinting and Social Engineering	2	6
Port Scanning	1	3
Microsoft Operating System Vulnerabilities	2	6
Midterm Review and Exam	1	3
Linux Operating System Vulnerabilities	2	6
Hacking Web Servers	1	3
Hacking Wireless Networks	1	3
Hacking Mobile Applications	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact	Planned	45	---	---	---	---	45

Hours	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", 2nd Edition, Syngress, 2013. - Michael T. Simpson, Nicholas Antill, "Hands-On Ethical Hacking and Network Defense", 3rd Edition, Cengage Learning, 2016.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Special Topics in Information Security

Course Code: 1400629-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Special Topics in Information Security – (1400629-3)			
2. Credit hours: 3			
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering			
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.			
5. Level/year at which this course is offered: Year 1, 2 or 3			
6. Pre-requisites for this course (if any): Graduate Standing			
7. Co-requisites for this course (if any): N/A			
8. Location if not on main campus: Male/Female Campus			
9. Mode of Instruction (mark all that apply):			
a. Traditional classroom	X	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: Discuss new topics which are selected from current literature in the field of information security. One or more areas within the field will be explored in details.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description: This course is intended to teach modern theory and practices in the field of information security. The course would have assignments and project for students to get hands on experience. Students should provide their findings through oral presentation and in writing.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
To be decided by the course instructor (TBD)	1-15	45

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
1.3	Understand how new knowledge is developed and applied	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
2.0	**Cognitive Skills**		
2.2	Can independently plan and execute a major project or piece of scholarly research applying practical and theoretical knowledge and research techniques and producing sound conclusions	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively through informal and formal reports, presentations, and publications	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
5.0	**Psychomotor(if any)**		
5.1	Be able to operate necessary computing systems and use required tools for that	Projects and Research activities	Exams, Reports, Presentations, and Research Papers

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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - To be decided by the course instructor
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples, presentation, and projects are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: _______________________ **Date Received:** _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Advanced Computer Networks

Course Code: 1400630-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Advanced Computer Networks– (1400630-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Examine current and emerging research topics in computer networking. Topics covered include network protocols, network measurement, Internet routing, peer to peer applications, new Internet architecture and technology, approaches and tools to achieve network reliability, scalability, and security. Students are expected to carry out a research project that may include modeling, analysis, design, and implementation components.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Review of Network services, layers, and applications: ISO/OSI and TCP/IP Layers, FTP, HTTP, SMTP, DNS, and P2P systems
- Types of Computer Networks and Transmission Systems: Circuit switching, Packet switching, Virtual circuit switching (ATM networks), Peer-to-Peer Networks, Multiplexing
- Internetworking and Packet Forwarding: Addressing, Internet Protocol (IP), IP Helpers (ARP, DHCP, ICMP, …), Routing, Global Routing, IPv4, IPv6, Multicast, Multiprotocol Label Switching (MPLS), Integrated Services (Guaranteed and Controlled), RSVP, Diff-serv, Internet AS
- Link layers, local area networks, and Ethernet
- Network transport architectures: UDP, TCP, RTP
- Routing and forwarding: Optimal routing, Routing in packet networks, intra-domain and inter-domain routing algorithms
- Congestion Control and Resource Allocation: Issues, FIFO, Fair Queueing, TCP Congestion Control, Congestion Avoidance Mechanisms, QoS
- Content delivery and Multimedia Networking
- Overlay-based Networks: Routing Overlays

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction, and Review of Network services, layers, and applications: ISO/OSI and TCP/IP Layers, FTP, HTTP, SMTP, DNS, and P2P systems	2	6
Types of Computer Networks and Transmission Systems: Circuit switching, Packet switching, Virtual circuit switching (ATM networks), Peer-to-Peer Networks, Multiplexing	1	3
Internetworking and Packet Forwarding: Addressing, Internet Protocol (IP), IP Helpers (ARP, DHCP, ICMP, …), Routing, Global Routing, IPv4, IPv6, Multicast, Multiprotocol Label Switching (MPLS), Integrated Services (Guaranteed and Controlled), RSVP, Diff-serv, Internet AS	2	6

Link layers, local area networks, and Ethernet	1	3
Network transport architectures: UDP, TCP, RTP	1	3
Midterm Review and Exam	1	3
Routing and forwarding: Optimal routing, Routing in packet networks, intra-domain and inter-domain routing algorithms	2	6
Congestion Control and Resource Allocation: Issues, FIFO, Fair Queueing, TCP Congestion Control, Congestion Avoidance Mechanisms, QoS	2	6
Content delivery and Multimedia Networking	1	3
Overlay-based Networks: Routing Overlays	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations

3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Alberto Leon-Garcia and Indra Widjaja, "Communication Networks: Fundamental Concepts and Key Architectures", 2nd Edition, McGraw-Hill, 2003.
- Larry Peterson, Bruce Davie, "Computer Networks: A Systems Approach", 5th Edition, Morgan Kaufmann, 2011.
- Douglas E. Comer, “Internetworking with TCP/IP Volume One”, 6th Edition, Pearson, 2013.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Network Programming and Management

Course Code: 1400631-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Network Programming and Management– (1400631-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

First, to first explain how to program clients as well as servers using widely used programming languages, platforms and frameworks, such as HTML, CSS, Java Script, XML, ASP.NET, and C#. It also discusses technologies that are used used in building web servers. The course gives hand on experience to students through multiple project and programming assignments
Second, To understand fundamental knowledge and concepts of architectures and standards of network management

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

Network Programming

- Introduction to Clients, Servers, their associated architectures and protocols.
- Software Architectures for Clients and Servers.
- Network and Operating System Support for Client-Server Applications.
- Standard interfaces and API.
- Examples of clients and servers for several popular protocols such as X, POP3, news, ftp, and http.
- Socket-based programming, programming and interfacing with web services
- Programming case studies: basic controls, validation, database interfacing, AJAX, sessions, cookies, file uploading and downloading, emails with attachments, and securing websites
- A website development project

Network Management

- Network management: standards, models, and language
- FCAPS: Management of Fault, configuration, Accounting, Performance, and Security
- SNMP network management protocols
- Remote monitoring (RMON)
- Broadband network management
- Telecommunications network management
- Network Management Tools and Systems
- Network Management Applications
- Web-based Management

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines and review of fundamental knowledge	1	4

Network Programming • Introduction to Clients, Servers, their associated architectures and protocols. • Software Architectures for Clients and Servers. • Network and Operating System Support for Client-Server Applications. • Standard interfaces and API. • Examples of clients and servers for several popular protocols such as X, POP3, news, ftp, and http. • Socket-based programming, programming and interfacing with web services • Programming case studies: basic controls, validation, database interfacing, AJAX, sessions, cookies, file uploading and downloading, emails with attachments, and securing websites • A website development project	7	28
Midterm Review and Exam	1	4
Network Management • Network management: standards, models, and language • FCAPS: Management of Fault, configuration, Accounting, Performance, and Security • SNMP network management protocols • Remote monitoring (RMON) • Broadband network management • Telecommunications network management • Network Management Tools and Systems • Network Management Applications • Web-based Management	6	24
Revision	1	4

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	30	---	---	30	---	60
	Actual						
Credit	Planned	2	---	---	1	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	40%
2	Midterm Exam	8-10	20%
3	Practical and Lab work	1-15	20%
4	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - David Makofske, Michael J. Donahoo, Kenneth L. Calvert, “TCP/IP Sockets in C#”, Morgan Kaufmann, 2004. - Alexandru Serban et al., “Pro .NET 1.1 Network Programming”, 2nd Edition, APress, 2004. - Alex R. Young, Marc Harter, “Node.js in Practice”, Manning Publications, 2014. - Mani Subramanian, “Network Management: Principles and Practice”, 2nd Edition, Pearson, 2010.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio Laboratory with about 25 PCs
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while board, and 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

- Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Adhoc and Sensor Networks

Course Code: 1400632-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Adhoc and Sensor Networks– (1400632-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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 provides the state of the art knowledge of both adhoc and sensor networks. It covers different topics on applications, hardware, network architecture, algorithms, protocols, mobility, disconnections, and battery energy consumption of both types of networks.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Introduction to adhoc and sensor networks
- Mobile Adhoc networks (MANETs): routing protocols, TCP for mobility and vehicular networks, scheduling, capacity, medium access, QoS, topology control, modeling techniques, and delay models
- Wireless Sensor Networks (WSNs): routing protocols, MAC layer provisions, energy saving, addressing, deployment, localization, synchronization, sleep scheduling, and topology management
- Hands-on experience through programming projects involving different platforms

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, review of fundamental knowledge, Introduction to adhoc and sensor networks	1	3
Mobile Adhoc networks (MANETs): routing protocols, TCP for mobility and vehicular networks, scheduling, capacity, medium access, QoS, topology control, modeling techniques, and delay models	6	18
Midterm Review and Exam	1	3
Wireless Sensor Networks (WSNs): routing protocols, MAC layer provisions, energy saving, addressing, deployment, localization, synchronization, sleep scheduling, and topology management	6	18
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Carlos De Morais Cordeiro, Dharma P. Agrawal, “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Pub, 2006. - Holger Karl, Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Modeling and Analysis of Computer Networks

Course Code: 1400633-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Modeling and Analysis of Computer Networks– (1400633-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

An introductory course on modeling and analysis of computer networks. The course introduces fundamental concepts, mathematical tools, techniques, and multiple practical case studies of how to model and analyze computer networks.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Introduction to Network Modeling
- Numerical, stochastic, and analytical modeling
- Measurement tools and performance metrics, conventional and non-conventional measures of system performance.
- Network Calculus
- Queuing networks, Markov process and its application for analyzing computer networks
- Building computer network models using computational packages, like Mathematica and Matlab
- Computer networks simulation
- Modeling discrete event system using petri-nets
- Protocol Analysis: flow and congestion control protocols, error control protocols, MAC protocols, traffic modeling, routing and scheduling…etc

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, review of fundamental knowledge, Introduction to network modeling	1	3
Numerical, stochastic, and analytical modeling	2	6
Measurement tools and performance metrics, conventional and non-conventional measures of system performance.	1	3
Network Calculus	2	6
Queuing networks, Markov process and its application for analyzing computer networks	2	6
Midterm Review and Exam	1	3
Building computer network models using computational packages, like Mathematica and Matlab	1	3
Computer networks simulation	1	3
Modeling discrete event system using petri-nets	1	3

Protocol Analysis: flow and congestion control protocols, error control protocols, MAC protocols, traffic modeling, routing and scheduling…etc	2	6
Revision	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Fayez Gebali, “Analysis of Computer Networks”, 2nd Edition, Springer, 2015.
- Jean-Yves Le Boudec, Patrick Thiran, “Network Calculus: A Theory of Deterministic Queuing Systems for the Internet”, Springer, 2001.
- Anurag Kumar, D. Manjunath and Joy Kuri, "Communication Networking: An Analytical Approach", Morgann Kaufmann, 2004.
- Mohamed Obaidat, Faouzi Zarai, Petros Nicopolitidis, “Modeling and Simulation of Computer Networks and Systems: Methodologies and Applications”, Morgan Kaufmann, 2015.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: _______________________ **Date Received:** _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Mobile and Wireless Communication Systems

Course Code: 1400634-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Mobile and Wireless Communication Systems– (1400634-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Cover concepts and fundamentals of the design of mobile and wireless communication systems, like cellular radio, packet radio networks, and indoor wireless networks

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Introduction to mobile and wireless communication systems and their associated network architectures
- Radio environment: radio propagation considerations and models, multipath propagation, Rayleigh and Rician statistics, power spectral density, large scale signal variation, channel fading, and the Doppler effect
- Link-level issues: modulation, multiple access, coding and error control, spread spectrum systems, CDMA, and OFDM
- System-level issues: cellular schemes, noise and interference, and cellular system standards
- Case studies: 5th generation wireless networks, Wireless Personal Area Networks (like Bluetooth and Zigbee), Wireless LAN (like different 802.11 standards), Wireless Metropolitan and Wide Area Networks (like WiMAX-2, LTE, and LTE advanced)
- Miscellaneous issues: Quality of service, TCP/IP, reliability, and security of mobile and wireless networks and satellite networks

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, review of fundamental knowledge, Introduction to mobile and wireless communication systems and their associated network architectures	1	3
Radio environment: radio propagation considerations and models, multipath propagation, Rayleigh and Rician statistics, power spectral density, large scale signal variation, channel fading, and the Doppler effect	2	6
Link-level issues: modulation, multiple access, coding and error control, spread spectrum systems, CDMA, and OFDM	3	9
System-level issues: cellular schemes, noise and interference, and cellular system standards	2	6
Midterm Review and Exam	1	3

Case studies: 5th generation wireless networks, Wireless Personal Area Networks (like Bluetooth and Zigbee), Wireless LAN (like different 802.11 standards), Wireless Metropolitan and Wide Area Networks (like WiMAX-2, LTE, and LTE advanced)	3	9
Miscellaneous issues: Quality of service, TCP/IP, reliability, and security of mobile and wireless networks and satellite networks	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

3

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		

4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Kaveh Pahlavan, Prashant Krishnamurthy, “Principles of Wireless Networks: A Unified Approach”, Prentice Hall, 2001.
- Theodore S. Rappaport, "Wireless Communications: Principles and Practice", 2nd Edition, Prentics Hall, 2002.
- Mischa Schwartz, "Mobile Wireless Communications", Cambridge University Press, 2004.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ________________________ Date Completed: _____________

Program Coordinator: ____

Signature: ___________________________ Date Received: _________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Internet of Things

Course Code: 1400635-3

Date: 1/11/2018.	**Institution**: Umm Al–Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Internet of Things– (1400635-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Introduce fundamentals and concepts of Internet of Things (IoT) technologies, standards, systems, and software. The course also discusses how to design and engineer and IOT-based 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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Introduction to IoT
- IoT devices and network protocols
- Positioning technologies, like GPS, WiFi and cellular localization
- Inertial sensing, like accelerometers, gyroscopes, and IMUs
- Miscellaneous sensors, like RFID, microphones and cameras
- Embedded hardware and software architecture
- iOS APIs for accessing various sensing and wireless networking technologies
- IoT standards
- Relevant applications areas, like smart transportation, smart parking, smart cities, smart environment, smart energy, smart health, and smart learning

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, review of fundamental knowledge, Introduction to IoT	1	3
IoT devices and network protocols	2	6
Positioning technologies, like GPS, WiFi and cellular localization	2	6
Inertial sensing, like accelerometers, gyroscopes, and IMUs	2	6
Midterm Review and Exam	1	3
Miscellaneous sensors, like RFID, microphones and cameras	1	3
Embedded hardware and software architecture	1	3
iOS APIs for accessing various sensing and wireless networking technologies	1	3
IoT standards	1	3
Relevant applications areas, like smart transportation, smart parking, smart cities, smart environment, smart energy, smart health, and smart learning	2	6
Revision	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%

2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Samuel Greengard, “The Internet of Things”, MIT Press, 2015.
- Arshdeep Bahga and Vijay Madisetti, “Internet of Things: A Hands-On Approach”, VPT, 2014.
- Ovidiu Vermesa and Peter Friess, "Internet of Things: From Research and Innovation to Market Deployment", River Publishers, 2014.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio

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

Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: ___________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Optical Networking

Course Code: 1400636-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Optical Networking – (1400636-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

Mode			
a. Traditional classroom	X	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 give an in-depth understanding of the functionality of optical networks, architecture, protocols and applications as well as how they may be implemented. Also, it will cover analytical and simulation models of the optical networking. Identifying the suitable optical technologies to meet a given performance requirement is one of the objective of this course.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

The Internet's evolution has been accompanied by exponentially growing traffic volume on the network infrastructure. Optical networks are ideally suited to carry such large volumes of traffic. This course provides an in-depth understanding of existing and emerging optical network technologies. Specific topics covered include:

- Basics of fiber optic communications
- SONET
- DWDM
- Optical Ethernet, FTTB, FTTH
- Optical wavelength switching
- IP over optical networks
- MPLS, and GMPLS
- Network control and management
- Static and dynamic service provisioning
- Optical network design, and future directions

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, review of fundamental knowledge, Introduction to Optical Network Technologies	1	6
Single Mode and Multimode Fibers	1	3
SONET	1	3
DWDM	1	3
IP Over SONET and IP Over DWDM	2	6
MPLS and GMPLS	2	6
Midterm Review and Exam	1	3
Optical Wavelength Switching	2	6
Optical Network Security	1	3
Optical Network Management	1	3

Optical Packet Switching	1	3
Revision and Project Presentations	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Biswanath Mukherjee, "Optical WDM Networks (Optical Networks)", Springer, 2006.
- Rajiv Ramaswami, Kumar Sivarajan, Galen Sasaki, "Optical Networks: A Practical Perspective", 3rd Edition, Morgan Faufmann, 2009.
- Xiaohua Jia, Xiao-Dong Hu, Ding-Zhu Du, "Multiwavelength Optical Networks", Springer, 2002.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Special Topics in Computer Networks

Course Code: 1400639-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Special Topics in Computer Networks – (1400639-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Discuss new topics which are selected from current literature in the field of Computer Networks. One or more areas within the field will be explored in details.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description: This course is intended to teach modern theory and practices in the field of computer networks. The course would have assignments and project for students to get hands on experience. Students should provide their findings through oral presentation and in writing.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
To be decided by the course instructor (TBD)	1-15	45

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
1.3	Understand how new knowledge is developed and applied	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
2.0	**Cognitive Skills**		
2.2	Can independently plan and execute a major project or piece of scholarly research applying practical and theoretical knowledge and research techniques and producing sound conclusions	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively through informal and formal reports, presentations, and publications	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
5.0	**Psychomotor(if any)**		
5.1	Be able to operate necessary computing systems and use required tools for that	Projects and Research activities	Exams, Reports, Presentations, and Research Papers

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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - To be decided by the course instructor
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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

- Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples, presentation, and projects are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: __________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Database and Information Management

Course Code: 1400640-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Database and Information Management – (1400640-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	X	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:

Expose students to the internals of database management systems, allowing them to understand its internal functionality. This will have a direct impact on using and tuning database management 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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

The course will cover techniques in schema designing, SQL queries, and relational algebra. Physical storage techniques. Query processing/optimization. Transaction management. Mechanisms for concurrency control and disaster recovery

- The Entity-Relationship Model
- Relational Algebra and Calculus
- SQL Queries, Constraints, and Triggers
- Physical Data Storage
- File Structure and Organization
- Data Indexing
- Query Evaluation
- Query Optimization
- Transaction Management
- Concurrency Control
- Recovery Management

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of basic concepts	1	3
The Entity-Relationship Model	1	3
Relational Algebra and Calculus	1	3
SQL Queries, Constraints, and Triggers	2	6
Physical Data Storage	1	3
File Structure and Organization	1	3
Data Indexing	1	3
Midterm Review and Exam	1	3
Query Evaluation	1	3
Query Optimization	1	3
Transaction Management	1	3

Concurrency Control	1	3
Recovery Management	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

3

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, 3rd Edition, McGraw-Hill, 2002.
- Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, 7th Edition, Pearson, 2015.
- Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, “Database systems: The Complete Book”, 2nd Edition, Pearson, 2008.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Distributed Database Systems

Course Code: 1400641-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Distributed Database Systems – (1400641-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Cover fundamental concepts and issues of distributed database systems. Student should first appreciate the limitations of a centralized database. Thereafter, understand transaction processing, query processing, reliability, and security issues of distributed database 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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

For the first part of the course, we will start by observing problems and investigating solutions in a centralized database. Then, we will extend to a distributed database and address the issues of distribution. The focus of this course is on concepts (algorithms and protocols) used in distributed databases. The theoretical work will be augmented with project work allowing students to implement some of the distributed algorithms or protocols.

- Architecture, design, and implementation of distributed database managements systems
- Data fragmentation, replication, and allocation
- Distributed transaction processing and concurrency control
- Distributed reliability and security
- Distributed query processing
- Parallel database systems
- Advanced Topics: like P2P databases, web databases, sensor and stream databases

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of basic concepts	1	3
Architecture, design, and implementation of distributed database managements systems	2	6
Data fragmentation, replication, and allocation	1	3
Distributed transaction processing and concurrency control	2	6
Distributed reliability and security	2	6
Distributed query processing	1	3
Midterm Review and Exam	1	3
Parallel database systems	2	6
Advanced Topics: like P2P databases, web databases, sensor and stream databases	2	6
Revision	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%

2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Tamer Ozsu and Patrick Valduriez, “Principles of Distributed Database Systems”, 3rd Edition, Springer, 2011.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio

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

Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Machine Learning

Course Code: 1400642-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Machine Learning – (1400642-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Introduce students to the primary approaches to machine learning from a variety of fields, including inductive inference of decision trees, neural network learning, statistical learning methods, reinforcement learning, clustering, and discovery.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

This course introduces the students to the field of Machine Learning (ML). ML is concerned with building systems and developing algorithms able to learn from past experiences to gain some insights of the future experiences. This course will overview some of the important concepts and techniques related to ML from both theoretical and practical perspectives.

- Introduction: What is machine learning? Concept formation
- Decision trees: test selection, pruning, MDLP, Increment versus Bach
- Instance-based learning; logically weighted regression
- Supervised and unsupervised learning
- Neural networks: Perceptrons and gradient descent, back propagation
- Bayesian approaches: Basics, EM, hidden Markov models
- Empirical evaluation of learning systems
- Boosting, feature selection
- Computational learning theory
- Scientific discovery; deviation detection
- Clustering
- Reinforcement learning; Q-learning; TD-learning
- Learning from time series

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction: What is machine learning? Concept formation	1	3
Decision trees: test selection, pruning, MDLP, Increment versus Bach	1	3
Supervised and unsupervised learning	1	3
Instance-based learning; logically weighted regression	1	3
Neural networks: Perceptrons and gradient descent, back propagation	1	3

Bayesian approaches: Basics, EM, hidden Markov models	1	3
Empirical evaluation of learning systems	1	3
Boosting, feature selection	1	3
Midterm Review and Exam	1	3
Computational learning theory	1	3
Scientific discovery; deviation detection	1	3
Clustering	1	3
Reinforcement learning; Q-learning; TD-learning	1	3
Learning from time series	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		

3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
3.2	Deal consistently and sensitively with complex ethical issues in academic and or professional contexts	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- S. Russell, P. Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Pearson, 2009.
- Christopher M. Bishop, "Pattern recognition and machine learning", Springer, 2011.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: __________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Multimedia Database

Course Code: 1400643-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Multimedia Database – (1400643-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Prepare students for research in multimedia database systems. Students are exposed to a variety of emerging innovative techniques to store, manipulate, communicate, visualize, and reason with multimedia 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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

This course provides a general coverage of three major areas that include multimedia data management (logical and physical modeling), broadband network architectures, and protocols for distributed multimedia communication, and user interface environments. The discussion is augmented with various case studies.

- Introduction to multimedia applications
- Multimedia Database Management: Logical Modeling
- Case Studies: Oracle Media Server
- Multimedia Database Management: Physical Management
- Distributed multimedia systems
- User Interface, tools and methodologies
- Design on Oracle Web Server

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction to multimedia applications	1	3
Multimedia Database Management: Logical Modeling	2	6
Case Studies: Oracle Media Server	2	6
Multimedia Database Management: Physical Management	2	6
Midterm Review and Exam	1	3
Distributed multimedia systems	2	6
User Interface, tools and methodologies	2	6
Design on Oracle Web Server	2	6
Revision	1	3

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

	Lecture	Tutorial	Laboratory/	Practical	Other	Total

				Studio			
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%

3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Guojun Lu, "Multimedia Database Management Systems", Artech House Publishers, 1999. - Bhavani Thuraisingham, "Managing and Mining Multimedia Databases", CRC Press, 2001.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Information Retrieval

Course Code: 1400644-3

Date: 1/11/2018.	**Institution**: Umm Al–Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Information Retrieval – (1400644-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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: Cover the practices, issues, and theoretical foundations of organizing and analyzing information and information content for the purpose of providing intellectual access to textual and non-textual information resources. This course will introduce students to the principles of information storage and retrieval systems and databases. Students will learn how effective information search and retrieval is interrelated with the organization and description of information to be retrieved. Students will also learn how to use a set of tools and procedures for organizing information, will become familiar with the techniques involved in conducting effective searches of online information resources and will build a professional search engine

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

This course covers basic and advanced techniques for text-based information systems. Students will explore organization, representation, and access to information; categorization, indexing, and content analysis; data structures for unstructured and semi structured data; design and maintenance of such databases, efficient text indexing, retrieval and classification schemes; use of codes, formats, and standards; analysis, construction and evaluation of search and navigation techniques; and Web search including crawling, link-based algorithms, and Web metadata; text/Web clustering, classification; and text mining. Students will be examined through a project along with a report and presentation, midterm and final exam, and exercises and class participation.

- Introduction to information retrieval
- Basic techniques, models and terms
- Basic tokenizing, indexing, and implementation of vector-space retrieval
- Experimental Evaluation of Information Retrieval: performance metrics, evaluations on benchmark text collections.
- Query operations and languages
- Text Representation: word statistics, morphology, index term selection using thesauri, metadata and markup languages (SGML, HTML, XML).
- Web Search: search engines, spidering, metacrawlers, robots, agents, and link analysis

- Text Categorization: categorization algorithms, applications to information filtering and organization
- Language-Model Based Retrieval: using Naive Bayes text classification for ad-hoc retrieval, improved smoothing for document retrieval
- Text Clustering: Clustering algorithms, applications to web search and information organization
- Information Extraction and Integration: web metadata, extracting data from text, semantic web, collecting and integrating specialized information on the web
- Recommender System: collaborative filtering and content-based recommendation of documents
- XML retrieval
- Multimedia Information Retrieval: mining information from audio, video, and text

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction to information retrieval Basic techniques, models and terms	1	3
Basic tokenizing, indexing, and implementation of vector-space retrieval	1	3
Experimental Evaluation of Information Retrieval: performance metrics, evaluations on benchmark text collections	1	3
Query operations and languages	1	3
Text Representation: word statistics, morphology, index term selection using thesauri, metadata and markup languages (SGML, HTML, XML)	1	3
Web Search: search engines, spidering, metacrawlers, robots, agents, and link analysis	1	3
Text Categorization: categorization algorithms, applications to information filtering and organization	1	3
Language-Model Based Retrieval: using Naive Bayes text classification for ad-hoc retrieval, improved smoothing for document retrieval	1	3
Midterm Review and Exam	1	3
Text Clustering: Clustering algorithms, applications to web search and information organization	1	3
Information Extraction and Integration: web metadata, extracting data from text, semantic web, collecting and integrating specialized information on the web	1	3
Recommender System: collaborative filtering and content-based recommendation of documents	1	3
XML retrieval	1	3
Multimedia Information Retrieval: mining information from audio, video, and text	1	3
Revision	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%

2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, “Introduction to Information Retrieval”, Cambridge University Press, 2008.
- Stefan Büttcher, Charles L. A. Clarke and Gordon V. Cormack, “Information Retrieval--Implementing and Evaluating Search Engines”, MIT Press, 2016.
- Bruce Croft, Donald Metzler, Trevor Strohman, “Search Engines: Information Retrieval in Practice”, Pearson, 2009.
- Baeza-Yates, Ribeiro-Neto, “Modern Information Retrieval: The Concepts and Technology behind Search”, 2nd Edition, Addison-Wesley Professional, 2011.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio

2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Big Data Analytics

Course Code: 1400645-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Big Data Analytics – (1400645-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

Mode	Mark		Percentage
a. Traditional classroom	X	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:

Discuss fundamental techniques, concepts, principles, and tools that are required for data science and big data analytics. The course is intended to establish a baseline that can be enhanced by future studies

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

This course discusses the fundaments of Big Data analytics. Covered topics include big data organization, storage, retrieval, representation, models, analysis and knowledge discovery. The course also has hands-on programming assignments and term project.

- Overview of Big Data
- Scalable Data Analytics Framework
- Large-scale Data Analysis Models
- Large-scale Data Analysis Design Patterns
- In-memory Data Analytics
- Distributed Storage Architecture
- NoSQL Databases
- Big data Technology and Tools: MapReduce and Hadoop
- Data Exchange Model

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Overview of Big Data	1	3
Scalable Data Analytics Framework	1	3
Large-scale Data Analysis Models	2	6
Large-scale Data Analysis Design Patterns	2	6
In-memory Data Analytics	1	3
Distributed Storage Architecture	1	3
Midterm Review and Exam	1	3
NoSQL Databases	2	6
Big data Technology and Tools: MapReduce and Hadoop	2	6
Data Exchange Model	1	3
Revision	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- EMC Education Services (Eds), "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 2015.
- Tom While, "Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale", 4th Edition, O'Reilly Media, 2015.
- Martin Kleppmann, "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems", O'Reilly Media, 2017.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.)

Ordinary classroom or video conference studio

2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Collective Decision Making

Course Code: 1400646-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Collective Decision Making – (1400646-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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 main objective of this course is to give students technical tools related to decision making especially for group of people to come with consensus or at least optimal decision.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Decision Theory
- Utilities, Preferences, and Constraints
- Multi Agent Systems and Making Collective Decisions
- Cooperative Games

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, review of fundamental concepts, and introduction to decision making	1	3
Utility functions and Qualitative Decision Making	1	3
Decision Making with Certainty in Combinatorial Domains	2	6
Decision Making with uncertain domains	2	6
Games and Fairness in Decisions	1	3
Midterm Review and Exam	1	3
Group Decision Making	3	9
Social Welfare for Group	2	6
Graphical Models for generalized independence utility	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - John S. Hammond, Ralph Keeney, Howard Raiffa, “Smart Choices: A Practical Guide to Making Better Decisions”, Harvard Business Review Press, 2015. - Ralph Keeney, Howard Raiffa, “Decisions with Multiple Objectives: Preferences and Value Trade-offs”, Cambridge University Press, 1993.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator

- Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Computational Social Choice

Course Code: 1400647-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Computational Social Choice – (1400647-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	X	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 goal is to give students the basic methods and techniques to computationally analyze different social activities (e.g. voting, aggregating preferences, choosing winner in e-auctions).

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- Axioms of Choice and Arrow's Impossibility Theorem
- Voting Theory and Voting Systems
- Representing and Reasoning about Humans' Preferences
- Consensus Decisions

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, review of fundamental concepts, and introduction to social choice	1	3
Voting Systems and Utility Functions	1	3
Winner Determination and Voting Rules	2	6
Preferences	2	6
Cake Cutting and Fair Division	1	3
Midterm Review and Exam	1	3
Probabilistic Voting Rules	3	9
Voting in Combinatorial Domains	2	6
Weighted Voting Games	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Felix Brandt, Vincent Conitzer, Ulle Endriss, Jerome Lang, Ariel D. Procaccia, "Handbook of Computational Social Choice", Cambridge University Press, 2016.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours

- Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ Date Completed: ___________

Program Coordinator: ____

Signature: ________________________ Date Received: _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Data Mining

Course Code: 1400648-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Data Mining – (1400648-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Data mining has emerged at the confluence of artificial intelligence, statistics, and databases as a technique for automatically discovering summary knowledge in large datasets. This course introduces students to the process and main techniques in data mining, including classification, clustering, and pattern mining approaches. Data mining systems and applications are also covered, along with selected topics in current research.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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
Course Outlines, review of fundamental concepts, and introduction to data mining	1	3
Data Warehouse	1	3
Data preprocessing	1	6
Data mining knowledge representation	1	6
Attribute-oriented analysis	1	3
Data mining algorithms: Association rules	2	6
Midterm Review and Exam	1	3
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
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						

Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - David J. Hand, Heikki Mannila, Padhraic Smyth, “Principles of Data Mining: Adaptive Computation and Machine Learning”, A Bradford Book, 2001. - Jiawei Han, Micheline Kamber, “Data mining: concepts and techniques”, 3rd Edition, Morgan Kaufmann, 2011. - Ian H. Witten, Eibe Frank, Mark A. Hall, Christopher J. Pal, “Data Mining: Practical machine learning tools and techniques”, 4th Edition, Morgan Kaufmann, 2016.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Special Topics in Information Management and Decision Making

Course Code: 1400649-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Special Topics in Information Management and Decision Making–(1400649-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Discuss new topics which are selected from current literature in the field of database and information management. One or more areas within the field will be explored in details.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description: This course is intended to teach modern theory and practices in the field of database and information management. The course would have assignments and project for students to get hands on experience. Students should provide their findings through presentation and in writing.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
To be decided by the course instructor (TBD)	1-15	45

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
1.3	Understand how new knowledge is developed and applied	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
2.0	**Cognitive Skills**		
2.2	Can independently plan and execute a major project or piece of scholarly research applying practical and theoretical knowledge and research techniques and producing sound conclusions	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively through informal and formal reports, presentations, and publications	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
5.0	**Psychomotor(if any)**		
5.1	Be able to operate necessary computing systems and use required tools for that	Projects and Research activities	Exams, Reports, Presentations, and Research Papers

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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - To be decided by the course instructor
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples, presentation, and projects are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: ________________________ **Date Received:** _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Image Processing

Course Code: 1400650-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Image Processing – (1400650-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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 cover the basic analytical methods which are widely used in image processing; to cover issues and technologies which are specific to images and image processing systems; to develop experience with using computers to process images

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

The covered topics related to Digital image fundamentals, image acquisition, basic relationships between pixels, imaging geometry, Image transforms, Image enhancement: in spatial domain and in frequency domain, image smoothing and sharpening, Image restoration: degradation models, inverse filter, Wiener filter, Color and pseudo-color image processing, application of image processing to various real life applications

- Digital Image Fundamentals
- Image Enhancement in the Spatial Domain
- Image Enhancement in the Frequency Domain
- Image Restoration
- Color Image Processing
- Digital Image Processing application in real life

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction and review of fundamental knowledge	1	3
Digital Image Fundamentals	2	6
Image Enhancement in the Spatial Domain	2	6
Image Enhancement in the Frequency Domain	2	6
Midterm Review and Exam	1	3
Image Restoration	2	6
Color Image Processing	2	6
Digital Image Processing application in real life	2	6
Revision	1	3

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

	Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total

Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%

3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 4th Edition, Pearson, 2017.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Computer Graphics

Course Code: 1400651-3

Date: 1/11/2018.	**Institution**: Umm Al–Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Computer Graphics – (1400651-3)			
2. Credit hours: 3			
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering			
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.			
5. Level/year at which this course is offered: Year 1, 2 or 3			
6. Pre-requisites for this course (if any): Graduate Standing			
7. Co-requisites for this course (if any): N/A			
8. Location if not on main campus: Male/Female Campus			
9. Mode of Instruction (mark all that apply):			
a. Traditional classroom	X	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:

- Provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
- Study computer graphics techniques, focusing on 2D and 3D modeling, rendering, and animation.
- Implement selected computer graphics algorithms.
- Study interactive computer graphics 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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

This course covers basic concepts, mathematical foundations, fundamental theory and algorithms, software techniques, and application examples of computer graphics. The main topics will center on modeling, rendering, interaction, and animation. Finally, a brief overview of various states of the art in computer graphics research topics will be presented. Students will be examined by a project along with a report, midterm, final exam, exercises and class participation.

- Introduction to graphics
- Transformations
- Modeling
- Rendering
- 2D and 3D Viewing
- Camera models
- Color models
- Lighting and reflection
- Shading
- Texture mapping
- Ray tracing
- Parametric curves and surfaces
- Animation

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Review of fundamental knowledge, and Introduction to graphics	1	3
Transformations	1	3
Modeling	1	3
Rendering	1	3
2D and 3D Viewing	1	3
Camera models	1	3

Color models	1	3
Lighting and reflection	1	3
Midterm Review and Exam	1	3
Shading	1	3
Texture mapping	1	3
Ray tracing	1	3
Parametric curves and surfaces	1	3
Animation	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		

3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Donald Hearn, M. Pauline Baker, Warren R. Carithers, “Computer Graphics with OpenGL”, 4th Edition, Pearson, 2010.
- Edward Angel, Dave Shreiner, “Interactive Computer Graphics”, 7th Edition, Pearson, 2014.
- John Kessenich, Graham Sellers, Dave Shreiner, “OpenGL Programming Guide: The Official Guide to Learning OpenGL”, 9th Edition, Addison-Wesley, 2016.
- Alan Watt, “3D Computer Graphics”, 3rd Edition, Addison-Wesley, 1999.
- Peter Shirley, Michael Ashikhmin, Steve Marschner, “Fundamentals of Computer Graphics”, 3rd Edition, A K Peters/CRC Press, 2009.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Computer Vision

Course Code: 1400652-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Computer Vision – (1400652-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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 students with in-depth understanding of important computer vision topics, problems and major approaches that address them. After completing the course, students are expected to have the knowledge needed to read and understand the more advanced topics and current research literature, and the ability to start working in industry or conduct academic research.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

This course covers: Image formation, Feature extraction, Segmentation, Camera Calibration, Dense motion estimation, 3D reconstruction, stereopsis and video analysis.

- Image formation: the pinhole camera model, focus/defocus, depth of view, field of view, image distortion
- feature extraction
- image segmentation
- Camera Calibration: pinhole model based calibration, correcting for radial and tangential distortion.
- Boundary detection and object recognition
- Structure from motion: triangulation, two-frame structure from motion, constrained structure from motion
- Dense motion estimation
- Stereo correspondence: epipolar geometry, sparse correspondence, dense correspondence, multi-view stereo
- 3D reconstruction: shape from-X, surface representations, recovering texture maps and albedos.
- Video analysis: back-ground subtraction, motion segmentation, tracking, Kalman filter

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction, and Review or fundamental knowledge	1	3
Image formation: the pinhole camera model, focus/defocus, depth of view, field of view, image distortion	1	3
feature extraction	1	3
image segmentation	1	3
Camera Calibration: pinhole model based calibration, correcting for radial and tangential distortion	1	3

Boundary detection and object recognition	1	3
Structure from motion: triangulation, two-frame structure from motion, constrained structure from motion	1	3
Midterm Review and Exam	1	3
Dense motion estimation	1	3
Stereo correspondence: epipolar geometry, sparse correspondence, dense correspondence, multi-view stereo	2	6
3D reconstruction: shape from-X, surface representations, recovering texture maps and albedos.	1	3
Video analysis: back-ground subtraction, motion segmentation, tracking, Kalman filter	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		

2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Richard Szeliski, "Computer vision: algorithms and applications", Springer, 2010.
- Richard Hartley, Andrew Zisserman, "Multiple View Geometry in Computer Vision", 2nd Edition, Cambridge University Press, 2004.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Computational Geometry

Course Code: 1400653-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Computational Geometry – (1400653-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

Mode	Mark		Percentage
a. Traditional classroom	X	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 objective of this course is to teach graduate students basic data structures used to represent geometric objects, varieties of algorithms used for geometric computations, design computational solutions to geometric problems, and write efficient programs for doing geometric 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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

Computational geometry is the study of the design and analysis of computer algorithms for geometric problems. The main topics covered in the course include the following: Convex Hulls, Object Intersection, Polygon triangulation, Range Searching, Planar Point Location, Proximity and Voronoi Diagram, Delaunay Triangulation and Arrangements.

- Introduction to Computational Geometry
- Line segment Intersection
- Polygon Triangulation
- Linear Programming
- Orthogonal Range Searching
- Point location
- Voronoi Diagrams
- Arrangements and Duality
- Delaunay Triangulations
- Convex Hulls
- Binary Space Partition

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Review of fundamental knowledge, and Introduction to Computational Geometry	1	3
Line segment Intersection	1	3
Polygon Triangulation	2	6
Linear Programming	2	6
Orthogonal Range Searching	1	3
Point location	1	3
Midterm Review and Exam	1	3
Voronoi Diagrams	1	3
Arrangements and Duality	1	3

Delaunay Triangulations	1	3
Convex Hulls	1	3
Binary Space Partition	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Mark de Berg , "Computational Geometry: Algorithms and Applications", 3rd Edition, Springer, 2008.
- J. Matousek, "Lectures on Discrete Geometry", Springer, 2002.
- Ketan Mulmuley, "Computational Geometry: An Introduction Through Randomized Algorithms", Pearson, 1993.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: _______________________ **Date Received:** _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Visualization

Course Code: 1400654-3

Date: 1/11/2018.	**Institution**: Umm Al–Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Visualization – (1400654-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

- Understand the principles of data and information visualization.
- Learn variety of existing techniques and systems in information visualization.
- Presentation of data that has some physical or geometric correspondence.
- Develop data visualization techniques and algorithms.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

This course develops a vocabulary and framework for discussing, critiquing, and designing information visualization tools and techniques.

- Representation of data in visual format
- Single and multi-dimensional data
- Dimensionality reduction techniques
- Volume visualization
- Information visualization
- Techniques for visualizing multivariate, temporal, text-based, geospatial, hierarchical, and network/graph-based data

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction and review of fundamental knowledge	1	3
Representation of data in visual format	1	3
Single and multi-dimensional data	2	6
Dimensionality reduction techniques	2	6
Volume visualization	2	6
Midterm Review and Exam	1	3
Information visualization	2	6
Techniques for visualizing multivariate, temporal, text-based, geospatial, hierarchical, and network/graph-based data	3	9
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact	Planned	45	---	---	---	---	45

Hours	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Alexandru C. Telea, “Data Visualization: Principles and Practice”, 2nd Edition, A K Peters/CRC Press, 2014. - Colin Ware, “Information Visualization, Perception for Design”, 3rd Edition, Morgan Kaufmann, 2012.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Pattern Recognition

Course Code: 1400655-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Pattern Recognition – (1400655-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

Mode			
a. Traditional classroom	X	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 fundamental theoretical and practical knowledge of pattern recognition.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

By successful completion of the course, the students will have solid understanding of the principles of pattern recognition, main methods for model performance estimation, have a good grasp of different parametric and non-parametric methods for classification; clustering algorithms, have hands-on experience of using pattern recognition methods in computer vision and biomedical applications and graphical models.

- Classifiers Based on Bayes Decision Theory
- Linear Classifiers
- Feature Selection
- Feature Generation: Data Transformation and Dimensionality Reduction
- Template Matching
- Supervised Learning: The Epilogue
- Clustering Algorithms I: Sequential Algorithms
- Clustering Algorithms II: Hierarchical Algorithms
- Clustering Algorithms III: Schemes Based on Function Optimization
- Learning with tree (Decision tree, Boosting, Bagging, Random forest)
- Graphical Models (Bayesian networks, Hidden markov model, Kalman filter

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of fundamental knowledge	1	3
Classifiers Based on Bayes Decision Theory	1	3
Linear Classifiers	1	3
Feature Selection	1	3
Feature Generation: Data Transformation and Dimensionality Reduction	1	3
Template Matching	1	3
Supervised Learning: The Epilogue	1	3
Midterm Review and Exam	1	3

Clustering Algorithms I: Sequential Algorithms	1	3
Clustering Algorithms II: Hierarchical Algorithms	1	3
Clustering Algorithms III: Schemes Based on Function Optimization	1	3
Learning with tree (Decision tree, Boosting, Bagging, Random forest)	2	6
Graphical Models (Bayesian networks, Hidden markov model, Kalman filter	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		

3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Sergios Theodoridis, Konstantinos Koutroumbas, "Pattern Recognition" 4th Edition, Academic Press, 2008.
- Keinosuke Fukunaga, "Introduction to Statistical Pattern Recognition", 2nd Edition, Academic press, 1990.
- Luc Devroye, László Györfi, Gábor Lugosi, "A Probabilistic Theory of Pattern Recognition", Springer, 1997.
- Satosi Watanabe (Eds), "Methodologies of Pattern Recognition", Academic Press, 2014.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Special Topics in Computer Vision and Graphics

Course Code: 1400659-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Special Topics in Computer Vision and Graphics – (1400659-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Discuss new topics which are selected from current literature in the field of computer vision and graphics. One or more areas within the field will be explored in details.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description: This course is intended to teach modern theory and practices in the field of computer vision and graphics. The course would have assignments and project for students to get hands on experience. Students should provide their findings through presentation and in writing.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
To be decided by the course instructor (TBD)	1-15	45

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
1.3	Understand how new knowledge is developed and applied	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
2.0	**Cognitive Skills**		
2.2	Can independently plan and execute a major project or piece of scholarly research applying practical and theoretical knowledge and research techniques and producing sound conclusions	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively through informal and formal reports, presentations, and publications	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
5.0	**Psychomotor(if any)**		
5.1	Be able to operate necessary computing systems and use required tools for that	Projects and Research activities	Exams, Reports, Presentations, and Research Papers
5.0	**Psychomotor(if any)**		
5.1			
5.2			

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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%

3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - To be decided by the course instructor
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples, presentation, and projects are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Advanced Software Engineering

Course Code: 1400660-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Advanced Software Engineering – (1400660-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	X	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 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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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
Course Outlines, introduction, and review of fundamental knowledge	1	3
Embedded software and systems engineering	1	3
Project Management - Project Planning and Scheduling	2	6
Software Engineering Process	3	9
Midterm Review and Exam	1	3
Software Architecture	2	6
Distributed Software Architectures using Middleware	2	9
Advanced Modelling	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Ian Sommerville, "Software Engineering", 10th Edition, Pearson, 2015.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Software Testing and Quality Assurance

Course Code: 1400661-3

Kingdom of Saudi Arabia **Ministry of Education** **Umm Al-Qura University** Deanship of Graduate Studies		المملكة العربية السعودية وزارة التعليم جامعة أم القرى عمادة الدراسات العليا

Date: **1/11/2018.**	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Software Testing and Quality Assurance – (1400661-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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.	2	6
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.	2	6
Levels of Testing unit testing (JUnit); integration testing; system testing; performance, stress, and configuration testing; regression testing; acceptance testing	2	6
Midterm Review and Exam	1	3

Object-oriented testing problems specific to OO testing adapting classic testing techniques to OO.	2	6
Test Tools and Automation	3	9
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		

4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Glenford J. Myers, Corey Sandler, Tom Badgett, "The Art of Software Testing", 3rd Edition, Wiley, 2011.
- Paul Ammann, Jeff Offutt, "Introduction to Software Testing", 2nd Edition, Cambridge University Press, 2016.
- Rex Black, "Advanced Software Testing - Vol. 1", 2nd Edition, Rocky Nook, 2015.
- Graham Bath, Judy McKay, "The Software Test Engineer's Handbook", 2nd Edition, Rocky Nook, 2012.
- Stephen Vance, "Quality Code: Software Testing Principles, Practices, and Patterns", Addison-Wesley Professional, 2013.

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

- IEEE related journals and conference papers
- ACM related journals and conference papers
- Springer related journals and conference papers
- Elsevier related journals and conference papers

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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Software Architecture

Course Code: 1400662-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Software Architecture – (1400662-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

Mode	Mark		Percentage
a. Traditional classroom	X	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 get the students to become more familiar with the different software architectures and to gain the knowhow on using these architectures.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

Throughout the course, students would learn

1. Concepts of virtual software bus
2. Concepts of CORBA and how to use it
3. Concepts of RMI/java and will gain hand on experience on how to program RMI applications
4. Concepts of SOA, web services and will gain hand on experience on how to program use it
5. Concepts of OAuth, trust, security and how to implement OAuth application.
6. Web bases attacks (SQL injections, session stealing, etc...) and how to protect your application
7. How to store login information on the client machine using temporary tokens.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, introduction, and review of fundamental knowledge	1	3
Virtual bus concept	1	3
CORBA concepts and implementation	2	6
RMI/Java	1	3
SOA and web services	1	3
OAuth concepts and implementation	2	6
Midterm Review and Exam	1	3
Multi-tier web applications and web framework (such as Spring)	2	6
Web bases attacks (SQL injections, session stealing, etc...) and how to protect your application	2	6
Student will learn how to store login information on the client machine using temporary tokens	1	3
Revision	1	3

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

	Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total

Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%

3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Thomas Erl, Andre Tost, Satadru Roy, Philip Thomas, Raj Balasubramanian, David Chou, Thomas Plunkett, "SOA with Java: Realizing Service-Orientation with Java Technologies", Prentice Hall, 2014. - Ryan Boyd, "Getting Started with OAuth 2.0: Programming Clients for Secure Web API Authorization and Authentication", O'Reilly Media, 2012. - Paco Hope, Ben Walther, "Web Security Testing Cookbook: Systematic Techniques to Find Problems Fast", O'Reilly Media, 2008.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio

2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: ________________________ **Date Received:** _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Service Oriented Architecture

Course Code: 1400663-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Service Oriented Architecture – (1400663-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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
Course Outlines, introduction, and review of fundamental knowledge	1	3
Software components	1	3
Web-services	2	6
Representational state transfer	1	3
Composition	1	3
Middleware	2	6
Midterm Review and Exam	1	3
Semantic web	2	6
Service qualities	1	3
Engineering SOA	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Thomas Erl, "Service-Oriented Architecture: Analysis and Design for Services and Microservices", 2nd Edition, Prentice Hall, 2016. - Douglas K. Barry, David Dick, "Web Services, Service-Oriented Architectures, and Cloud Computing: The Savvy Manager's Guide", 2nd Edition, Morgan Kaufmann, 2013.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: ________________________ **Date Received:** _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Software Project Management

Course Code: 1400664-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Software Project Management – (1400664-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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 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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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
Course Outlines, introduction, and review of fundamental knowledge	1	3
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	1	3
Midterm Review and Exam	1	3
Testing strategies	2	6
Risk management	1	3
Development methods: Iterative and incremental development	1	3
Agile development techniques	1	3
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						

Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Kathy Schwalbe, "Information Technology Project Management", 8th Edition, Cengage Learning, 2015. - Ian Sommerville, "Software Engineering", 10th Edition, Pearson, 2015. - Roger S. Pressman, Bruce Maxim, "Software Engineering: A Practitioner's Approach" 8th Edition, McGraw-Hill, 2014.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: ________________________ **Date Received:** _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Mobile Application Development

Course Code: 1400665-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Mobile Application Developmment – (1400665-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	X	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 combine the techniques learned in previous software development modules with the unique characteristics and rapidly changing aspects of mobile and embedded systems 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 and embedded systems 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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

People are increasingly using 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. Similarly, embedded systems development significantly matured in recent years. This course also introduce basics of embedded systes deelopment

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
Course Outlines, introduction, and review of fundamental knowledge	1	3
Overview of Mobile App Development: - 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 (1) - Techniques, Methodologies for Mobile Application Development - Mobile Application Development Frameworks - Persistent Data in Mobile Apps - Maps and Location in Mobile Apps	2	6
Midterm Review and Exam	1	3
Developing the Mobile App (2) - Access to Hardware and Sensors - Building Mobile Apps Powered by Enterprise Backend - Secured Data Store and Synchronization	2	6
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	2	6
Developing Embedded Systems Applications - Embedded Systems Development Process and Lifecycle - Embedded Systems Development Tools - Real-time Development - Embedded system application testing	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Jakob Iversen, Michael Eierman, "Learning Mobile App Development: A Hands-on Guide to Building Apps with iOS and Android", Addison-Wesley Professional, 2013. - Leigh Williamson et al., "Enterprise Class Mobile Application Development: A Complete Lifecycle Approach for Producing Mobile Apps", IBM Press, 2015. - Sachin Date, "An Illustrated Guide to Mobile Technology", CreateSpace Independent Publishing Platform, 2015.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator

- Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ Date Completed: ____________

Program Coordinator: ____

Signature: _________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Web Application Development

Course Code: 1400666-3

Date: 1/11/2018.	**Institution**: Umm Al–Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Web Application Development – (1400666-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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. The course covers both theoretical and practical aspects of web application development. Throughut the course, students would be exposed to different development frameworks, such as .NET and JEE.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

- 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.
- Cover important techniques and issues in designing and building large scale web systems.
- Consider development methods and patterns which enhance maintainabilty and testability, such as web components, MVC, ORM, and HTML template engines.
- 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
Course Outlines, Introduction, and 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 and JEE - underlying .NET and JEE technologies such as C#, ASP, and LINQ - ASP.NET and JEE web pages and web forms - ASP.NET and JEE Razor and MVC - comparison with other approaches to Web Development - comparison of client-side versus server-side programming	3	9

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
Midterm Review and Exam	1	3
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	1	3
Performance modelling and management - partitioning and parallelism, Amdahl's law - performance modelling and benchmarking - graceful degradation (admission control, disabling recommendations)	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks

- Adam Freeman, Steven Sanderson, “Pro ASP.NET MVC 4”, 4th Edition, Apress, 2012.
- Imar Spaanjaars, “Beginning ASP.NET in C# and VB”, Wrox, 2014.
- Cal Henderson, “Building Scalable Web Sites: Building, Scaling, and Optimizing the Next Generation of Web Applications”, O'Reilly Media, 2006.

2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors

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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Geographical Informtion Systems

Course Code: 1400667-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Geographical Information Systems – (1400667-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	X	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 give 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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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
Course Outlines, introduction to GIS, and review of fundamental knowledge	1	3
ArcGIS	2	6
Working with ArcMap	2	6
Coordinate Systems and Map Projections	2	6
Working with Tables	1	3
Midterm Review and Exam	1	3
Spatial Joins	2	6
Geocoding	1	3
Working with Geodatabases	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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):

Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - Michael Law, Amy Collins, "Getting to Know ArcGIS: For 10.3/10.3.1" Esri Press, 2018. - Paul Bolstad, "GIS Fundamentals: A First Text on Geographic Information Systems", 5th Edition, XanEdu Publishing Inc, 2016.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester

2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: ________________________ **Date Received:** _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Design Patterns

Course Code: 1400668-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Design Patterns – (1400668-3)

2. Credit hours: 3

3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering

4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.

5. Level/year at which this course is offered: Year 1, 2 or 3

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

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

8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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 students professional development capabilities by introducing them to design patterns. Design patterns are widely accepted general solutions to commonly encountered problems in software design. Mastering these design patterns is a kind of software reuse that is essential for developers to produce high-quality code. Job interviews nowadays focus extensively on testing job seekers on these design patterns. In fact, a good developer is a developer that has, among other qualities, the ability to apply patterns effectively.

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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 and details of different design patterns. Topics includes interface patterns, responsibility patterns, construction patterns, operation patterns, and extension patterns.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Course Outlines, Introduction, Definition of design patterns, and quick review on the OO concepts needed to implement design patterns in Java.	1	3
Interface Patterns: Introducing Interfaces; Adapter; Facade; Composite; Bridge	3	9
Responsibility Patterns: Introducing Responsibility; Singleton; Observer; Mediator; Proxy; Chain of Responsibility; Flyweight	2	6
Construction Patterns: Introducing Construction; Builder; Factory Method; Abstract Factory; Prototype; Memento	2	6
Midterm Review and Exam	1	3
Operation Patterns: Introducing Operations; Template Method; State; Strategy; Command; Interpreter	3	9
Extension Patterns: Introducing Extensions; Decorator; Iterator; Visitor	2	6
Revision	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3

	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
2.0	**Cognitive Skills**		
2.1	Apply practical and theoretical knowledge in dealing with novel and unpredictable contexts	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and 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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%
3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - S. Metsker, W. Wak, "Design Patterns in Java", 2nd Edition, Addison Wesley, 2006. - E. Gamma et al., "Design Patterns: Elements of Reusable Object-Oriented Software", Addison Wesley, 1994.
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _______________________ Date Completed: ____________

Program Coordinator: ____

Signature: __________________________ Date Received: ________________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Special Topics in Software Engineering

Course Code: 1400669-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Special Topics in Software Engineering – (1400669-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female Campus

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

a. Traditional classroom	X	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:

Discuss new topics which are selected from current literature in the field of software engineering. One or more areas within the field will be explored in details.

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) - University digital library has subscriptions in many research databases with state-of-the-art materials in the area - The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:
This course is intended to teach modern theory and practices in the field of software engineering. The course would have assignments and project for students to get hands on experience. Students should provide their findings through presentation and in writing.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
To be decided by the course instructor (TBD)	1-15	45

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.2	Have detailed understanding of one or more complex areas within the field of computer science and engineering	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
1.3	Understand how new knowledge is developed and applied	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
2.0	**Cognitive Skills**		
2.2	Can independently plan and execute a major project or piece of scholarly research applying practical and theoretical knowledge and research techniques and producing sound conclusions	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperate fully and constructively with others	Group discussion, Projects, and Seminars	Reports, and Presentations
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively through informal and formal reports, presentations, and publications	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
4.3	Use a wide range of appropriate information and communications technology in investigating issues	Lectures, Group discussion, Projects, and Seminars	Exams, Reports, and Presentations
5.0	**Psychomotor(if any)**		
5.1	Be able to operate necessary computing systems and use required tools for that	Projects and Research activities	Exams, Reports, Presentations, and Research Papers
5.0	**Psychomotor(if any)**		
5.1			
5.2			

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	Final Exam	16-17	50%
2	Midterm Exam	8-10	20%

3	Other Semester Work (Quizzes, Assignments, Projects, Essay, Presentation … etc)	Throughout the semester	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - To be decided by the course instructor
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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 - Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples, presentation, and projects are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ **Date Completed: ___________**

Program Coordinator: ____

Signature: ________________________ **Date Received: _______________**

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Directed Study I

Course Code: 1400696-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Directed Study I – (1400696-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): Graduate Standing, Consent of Instructor
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female 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	X	percentage?	100%

Comments:

B Objectives

1. The main objective of this course:

The student investigate a research area under the supervision of a faculty member, beyond the scope of existing courses

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

This course is intended to allow a student to investigate and start working in advanced problems related to his research area. A course plan should be submitted and approved by the graduate advisor or the program coordinator. The student should deliver a public seminar and a report on his/her outcomes at the end of the course.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
To be decided by the faculty member (TBD)	1-15	45

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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**		
1.3	Understand how new knowledge is developed and applied	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
2.0	**Cognitive Skills**		
2.2	Can independently plan and execute a major project or piece of scholarly research applying practical and theoretical knowledge and research techniques and producing sound conclusions	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
3.0	**Interpersonal Skills & Responsibility**		
3.2	Deal consistently and sensitively with complex ethical issues in academic and or professional contexts	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively through informal and formal reports, presentations, and publications	Lectures, Group discussion, Projects, Seminars, and Research activities	Exams, Reports, Presentations, Research Papers, and Anti plagiarism software
4.2	Obtain, critically evaluate, and make effective use of mathematical and statistical data	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
5.0	**Psychomotor(if any)**		
5.1	Be able to operate necessary computing systems and use required tools for that	Projects and Research activities	Exams, Reports, Presentations, and Research Papers

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 and report on outcomes	15	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): Course Instructor would dedicate at least two office hours in two different days of the week

E Learning Resources

1. List Required Textbooks - State of the art textbooks in the specific area of the course
2. List Essential References Materials (Journals, Reports, etc.) - IEEE related journals and conference papers - ACM related journals and conference papers - Springer related journals and conference papers - Elsevier related journals and conference papers
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.

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.) Ordinary classroom or video conference studio
2. Technology resources (AV, data show, Smart Board, software, etc.) Datashow, PC/Laptop with a presentation software installed, ordinary while 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

- Online form available throughout the semester, which is automatically directed to the program coordinator - Hardcopy student survey forms are collected at the end of the semester
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department - Instructor: getting student feedback orally through lectures and office hours - Program Administrators: Follow-up by program coordinator, chairs of academic departments, and vice dean of research and scientific research.
3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Arbitrary exam papers as well as student samples, presentation, projects, and final reports are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: _____________________ **Date Completed:** ___________

Program Coordinator: ____

Signature: ________________________ **Date Received:** _______________

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Directed Study II

Course Code: 1400697-3

Date: 1/11/2018.	**Institution**: Umm Al-Qura University
College: Computers and Information Systems	**Department**: Computer Science and Engineering

A. Course Identification and General Information

1. Course title and code: Directed Study II– (1400697-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M. Sc. in Computer Science and Engineering
4. Name of faculty member responsible for the course: Faculty members within the college of Computers and Information Systems, specialized in the area.
5. Level/year at which this course is offered: Year 1, 2 or 3
6. Pre-requisites for this course (if any): 1400696-3, Consent of Instructor
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: Male/Female 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	X	percentage?	100%

Comments:

B Objectives

1. The main objective of this course:

The student further studies and masters the research area, which he investigates in 1400696-3. The course is offered under the supervision of a faculty member, beyond the scope of existing courses

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)

- University digital library has subscriptions in many research databases with state-of-the-art materials in the area

- The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry

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

Course Description:

This course is intended to allow a student to further study and master the advanced problem, which he investigated in 1400696-3. The course is only offered to students who produce significant outputs (through the seminar and the written report) in 1400696-3. The output of 1400696-3 should be promising and the scale of the investigated problem should be large enough to deserve taking 1400697-3. A course plan should be submitted and approved by the graduate advisor or the program coordinator. At the end of the course, the student should submit a ready-to-publish article to the course instructor. The student should also deliver a public seminar and a report on his/her outcomes at the end of the course.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
To be decided by the faculty member (TBD)	1-15	45

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45	---	---	---	---	45
	Actual						
Credit	Planned	3	---	---	---	---	3
	Actual						

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

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

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4.2	Obtain, critically evaluate, and make effective use of mathematical and statistical data	Lectures and Group discussion	Exams, Quizzes, Homework, and Reports
5.0	**Psychomotor(if any)**		
5.1	Be able to operate necessary computing systems and use required tools for that	Projects and Research activities	Exams, Reports, Presentations, and Research Papers

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**
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3. Procedures for Teaching Development - Circulating student feedback to instructors - Awards for teaching excellence - Circulating courses between different instructors
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) Student sample work, presentation, projects, and final report are checked by independent faculty members within the college.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The whole program with all its courses are reviewed and updated every 3-4 years according to the evolution of the discipline in both academia and industry.

Name of Course Instructor: ____

Signature: ______________________ **Date Completed:** ____________

Program Coordinator: ____

Signature: _________________________ **Date Received:** ________________