Course Specification

(Postgraduate Programs)

Course Title:	Computer Systems for Crowd Management
Course Code:	CE6036
Program:	Master of Science in Computer Engineering
Department:	Computer and Network Engineering
College:	College of Computing
Institution:	Umm Al-Qura University
Version:	1.0
Last Revision Date:	12/4/2025

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: (3)				
2. Course type				
A.	☐University	☐College	☒ Department	☐ Track
B.	☐Required		☒ Elective	
3. Level/year at which this course is offered: (Level 3 or 4)				
4. Course General Description:				
This course offers an in-depth exploration of computer engineering applied to crowd management, focusing on how computer engineering principles and tools can be leveraged to analyze, simulate, and manage large groups of people effectively and safely. Students will learn about the latest advancements in crowd modeling, real-time monitoring systems, data analytics, and control mechanisms that contribute to efficient crowd management in various settings such as urban environments, transportation hubs, large events (e.g., Hajj), and emergency situations.				
5. Pre-requirements for this course (if any)**:**				
6. Co-requisites for this course (if any)**:**				
7. Course Main Objective(s):				
1. Understanding how large crowded events are organized and managed 2. Analyzing the requirements of Managing Crowded Events 3. Analyzing use cases and technology gaps in Crowded Events 4. Evaluating Solutions provided for Crowd Management 5. Creating sustainable solutions for Crowd Management				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	25
2.	Laboratory/Studio	0
3.	Field	15
4.	Tutorial	0
5.	Others – Scientific Conferences	5
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify challenges in the design of computer systems for crowd management	K1	Lectures, and reading assignments	Written exams, assignments, projects and oral presentations
1.2	Explain fundamentals, concepts, terminologies and characteristics of designing computer systems for crowd management	K2		
2.0	**Skills**			
2.1	Design and implement modern computer systems for crowd management	S1	Lectures, project, discussions, tutorials	Written exams, assignments, projects and oral presentations

Code	Course Learning Outcomes	Code of PLOs	Teaching Strategies	Assessment Methods
2.2	Apply principles of computer systems, modeling, and simulation to solve the complex problems of managing crowds	S2		
2.3	Communicate effectively through a written report embodying the design, implementation, evaluation of computer systems for crowd management	S3		
2.4	Evaluate the performance of computer systems for crowd management	S4		
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate commitment to ethical and professional responsibilities in computer systems for crowd management	V1	Lectures, project, discussions, assignments and projects	Group assignments and projects
3.2	Work in a team to implement a project in computer systems for crowd management	V2	Group assignments and projects	Group assignments and projects

C. Course Content:

No	List of Topics	Contact Hours
1.	Managing Massive Crowded Events	10
2.	Technology used in Hajj and Umrah Management (Field Visits)	20
3.	Technology Trends in Computing	10
4.	Topics on System Design and Critical Thinking,	5
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Crowd Management Technology Requirements (Oral Presentation + Report)	2	30%
2.	Technology Gap in Hajj and Umrah Management (Oral Presentation + Report)	6	30%
3.	Sustainable Solution Design Architecture (Oral Presentation + Report)	8	20%
4.	Solution implementation and evaluation (Oral Presentation + Report)	10	20%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	Introduction to Crowd Science by G. Keith Still, CRC Press, 2014, https://doi.org/10.1201/b17097
Supportive References	Applied Crowd Science by G. Keith Still, CRC Press, 2021, https://doi.org/10.1201/9781351053068 Introduction to Crowd Management: Managing Crowds in the Digital Era: Theory and Practice by Claudio Feliciani, Kenichiro Shimura, and Katsuhiro Nishinari. Springer Nature, 2022, https://doi.org/10.1007/978-3-030-90012-0
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Program Leaders	Indirect
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Students, Faculty	Indirect
The extent to which CLOs have been achieved	Students, Faculty, Program Leaders	Direct and Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Computer and Network Engineering Department Council**
REFERENCE NO.	**The 18th Session Of The Academic Year 1446**
DATE	**15/4/2025**