



Course Specification

(Postgraduate Programs)

Course Title: Design Principles of IoT Systems

Course Code: CE6301

Program: Master of Science in Computer Engineering

Department: Computer and Network Engineering

College: College of Computing

Institution: Umm Al-Qura University

Version: 2.0

Last Revision Date: 12/4/2025



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A. General information about the course:

1. Course Identification:

1. Credit hours: (3)				
2. Course type				
A.	<input type="checkbox"/> University	<input type="checkbox"/> College	<input type="checkbox"/> Department	<input checked="" type="checkbox"/> Track
B.	<input checked="" type="checkbox"/> Required in Embedded Systems and IoT Track		<input checked="" type="checkbox"/> Elective in the other tracks	
3. Level/year at which this course is offered: (Level 4)				
4. Course General Description:				
<p>This course presents a comprehensive overview of IoT systems architecture with all of its key components: edge, communications, cloud, data processing, security, management, and uses. This course provides a reference and foundation for students that they can build upon to design IoT systems.</p>				
5. Pre-requirements for this course (if any):				
Embedded Systems				
6. Co-requirements for this course (if any):				
None				
7. Course Main Objective(s):				
<p>This objective is to provide:</p> <ul style="list-style-type: none"> • A solid foundation to designing IoT systems and components • Concepts of edge and cloud computing • Various communications in IoT systems • A knowledge of data models and standards • In-depth understanding of state-of-the-art platforms 				

2. Teaching Mode: (mark all that apply)



No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100

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

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
	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 IoT systems	K1	Lectures, and reading assignments	Written exams, assignments, projects and oral presentations
1.2	Explain fundamentals of IoT system design concepts, terminologies and characteristics	K2		
2.0	Skills			
2.1	Design and implement IoT systems using modern standards and platforms	S1	Lectures, project, discussions, tutorials	Written exams, assignments, projects and oral presentations
2.2	Apply principles of IoT systems to solve complex problems	S2		
2.3	Communicate effectively through a written report embodying the design, implementation, evaluation of IoT systems	S3		
2.4	Evaluate the performance of IoT systems	S4		
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate commitment to ethical and professional responsibilities in IoT systems	V1	Lectures, project, discussions, assignments and projects	Group assignments and projects





Code	Course Learning Outcomes	Code of PLOs	Teaching Strategies	Assessment Methods
3.2	Work in a team to implement a project in IoT systems	V2	Group assignments and projects	Group assignments and projects

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to IoT	3
2.	IoT system edge	5
3.	Communications in IoT Systems	5
4.	Clouds in IoT Systems	5
5.	IoT Data Models	6
6.	IoT Data Standards	6
7.	IoT Platforms	6
8.	Stat-of -the-art IoT System Design in the literature	9
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid-Term Exam	9	20
2.	Assignments	4 and 9	20
3.	Project	11	20
4.	Presentation of scientific article	13	20
5.	Final Exam	15	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	Internet of Things: Concepts and System Design by Milan Milenkovic, Springer, 2020, ISBN: 978-3-030-41345-3 (print), 978-3-030-41346-0 (eBook)
Supportive References	Internet of Things: Theory to Practice 1st Edition, by Pramod R. Gunjal, Satish R. Jondhale, Jaime Lloret Mauri, and Karishma Agrawal, CRC Press, 2024, ISBN-10 : 1032251689, ISBN-13 : 978-1032251684



	Principles of Internet of Things (IoT) Ecosystem: Insight Paradigm by Sheng-Lung Peng, Souvik Pal, and Lianfen Huang, Springer, 2020, ISBN: 978-3-030-33595-3 (hardcover), 978-3-030-33598-4 (softcover), 978-3-030-33596-0 (eBook)
Electronic Materials	The instructor may provide as per requirements
Other Learning Materials	The instructor may provide as per requirements

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 18 th Session Of The Academic Year 1446
DATE	15/4/2025

