



Course Specification

(Bachelor)

Course Title: **IoT Application Development**

Course Code: **SE3605**

Program: **BSc in Software Engineering**

Department: **Software Engineering**

College: **College of Computing**

Institution: **Umm Al Qura University**

Version: **1.0**

Last Revision Date: **22/04/2025**



Table of Contents

A. General information about the course:	3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods	4
C. Course Content	5
D. Students Assessment Activities	5
E. Learning Resources and Facilities	6
F. Assessment of Course Quality	7
G. Specification Approval	7



A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A. University College Department Track Others
 B. Required Elective

3. Level/year at which this course is offered: (3rd year/ 5th or 6th level) or (4th year/8th level)

4. Course General Description:

The course introduces the design and development of applications and systems for Internet of Things (IoT) devices. Topics will include IoT technology and devices, communication, data storage, application development, machine learning for IoT data, and distributed systems for supporting IoT devices

5. Pre-requirements for this course (if any):

SE2301 - Software Modelling and Analysis

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

N/A

7. Course Main Objective(s):

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

1. Explain concepts of IoT devices and applications.
2. Explain emerging trends in IoT applications and theory.
3. Design and implement IoT devices and applications
4. Utilize communication protocols for IoT devices.
5. Transfer data between IoT devices and distributed system infrastructure.
6. Implement and secure data and communications with IoT devices.
7. Design and implement scalable systems for large IoT deployments.
8. Build, design, and implement machine learning algorithms for IoT data.



2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	0	0
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 	0	0
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
Total		60

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

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Understand the foundational principles of the Internet of Things (IoT)	K1	Lecture, Exercises	Quizz, Lab, Exam, Assignment
1.2	Learn the architecture and communication protocols used in IoT applications	K2	Lecture, Exercises	Quizz, Lab, Exam, Assignment
1.3	Explore the role of cloud computing and distributed systems in IoT data management	K3	Lecture, Exercises	Quizz, Lab, Exam, Assignment
2.0	Skills			



Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.1	Develop IoT applications, including device integration and network communication	S1	Lecture, Exercises	Quizz, Lab, Exam, Assignment
2.2	Analyze and manage IoT data using machine learning techniques like classification and clustering	S1	Lecture, Exercises	Quizz, Lab, Exam, Assignment
2.3	Implement distributed database systems to store and process IoT data efficiently	S2	Lecture, Exercises	Quizz, Lab, Exam, Assignment
3.0	Values, autonomy, and responsibility			
3.1	Emphasize security and privacy in IoT application development	V1	Lecture, Exercises	Quizz, Lab, Exam, Assignment
3.2	Promote sustainable and scalable IoT solutions to address global challenges	V1	Lecture, Exercises	Quizz, Lab, Exam, Assignment

C. Course Content

No	List of Topics	Contact Hours
1.	Foundations of IoT	4
2.	IoT Application Development	8
3.	Network Communications	4
4.	IoT Data	8
5.	Cloud Computing	4
6.	Distributed Systems and Databases	8
7.	System Programming	8
8.	Machine Learning	8
9.	Classification and Clustering	8
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments and Quizzes	2-14	15





No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Projects	2-14	15
3.	Practicals	2-14	10
4.	Mid Term	7	20
5.	Final Exam	16-17	40

*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	<ul style="list-style-type: none"> Bahga, A., & Madiseti, V. (2015). <i>Internet of Things: A hands-on approach</i>. VPT. ISBN 978-0996025516. Hanes, D., Salgueiro, G., Grossetete, P., Barton, R., & Henry, J. (2017). <i>IoT fundamentals: Networking technologies, protocols, and use cases for the Internet of Things</i>. Cisco Press. ISBN 978-1587144561.
Supportive References	<ul style="list-style-type: none"> Hanes, D., Salgueiro, G., Grossetete, P., Barton, R., & Henry, J. (2017). <i>IoT fundamentals: Networking technologies, protocols, and use cases for the Internet of Things</i>. Cisco Press. ISBN 978-1587144561. McEwen, A., & Cassimally, H. (2013). <i>Designing the Internet of Things</i>. Wiley. ISBN 978-1118430620.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Traditional Classroom
Technology equipment (projector, smart board, software)	Multimedia Projector
Other equipment (depending on the nature of the specialty)	N/A





F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct, Indirect
Effectiveness of Students' assessment	Faculty, Peer reviewer	Direct, Indirect
Quality of learning resources	Faculty, Course coordinator	Direct, Indirect
The extent to which CLOs have been achieved	Course coordinator, Program management committee	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	SOFTWARE ENGINEERING DEPARTMENT COUNCIL
REFERENCE NO.	THE 17TH MEETING FOR THE ACADEMIC YEAR 1446H
DATE	22/04/2025

