هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Internet of Things
Course Code:	422CCN-3
Program:	Bachelor of Science in Computer Networks
Department:	Networks and Communications Engineering
College:	College of Computer Science and Information Systems
Institution:	Najran University
Version:	1.0
Last Revision Date:	20 Feb 2024

Table of Contents

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: (Level 8 / Year 4)					
4. Course General Description:					
The Internet of Things (IoT) is a distributed system, in which autonomous devices, sometimes called motes, collect environmental data (such as location, speed, temperature, humidity and sound level) or, more recently, medical data (such as heart rate, blood oxygen level and pulse rate). The data is collected across the network, aggregated and fed into business applications. Sensor and actuator networks, telemetry, data processing, distributed data bases, machine vision, AI and analytics are enablers for various applications, including environmental monitoring and control, agricultural monitoring and control, medical monitoring, habitat monitoring and military surveillance. In this subject, students learn the theory, the concepts and the practice of the new paradigm. By designing and developing a medium-complexity, IoT-based application, students learn new skills, learn the benefits of the technology, and explore new models of service deployment and data delivery.					
5. Pre-requirements for this course (if any)**:**					
No					
6. Co-requisites for this course (if any)**:**					
No					
7. Course Main Objective(s):					
After completing the course students will be able to 1. Discuss the theory, concepts, terminologies, architecture of IoT and relevant skills and knowledge gained in IoT as a whole. 2. Explain an integrated, multidisciplinary approach for IoT-based solutions, and apply it to real-world scenarios for building various applications. 3. Explain the principles of sensing/actuation, data transmission and processing, visualization, and analytics, as well as cyber security and privacy issues in IoT. 4. Analyze, design and implement a distributed IoT system, and its components and address its connectivity issues.					

5. Execute independent investigation of new IoT applications, methods, protocols, technologies, programming models and tools, as well as application development concepts.
6. Evaluate model applicability, accuracy and limitations.
7. Communicate effectively in ways appropriate to the discipline, audience and purpose

Recognize and appreciate the collaborative nature of IoT development and the teamwork involved

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Discuss the theory, concepts, terminologies, architecture of IoT and relevant skills and knowledge gained in IoT as a whole	K2	Lectures, Small Group Work, Small Group Discussion	Quizzes, Midterm-Exam, Final Exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	Explain an integrated, multidisciplinary approach for IoT based solutions, and apply it to real-world scenarios for building various applications.	K1, K2	Lectures, Small Group Work, Small Group Discussion	Quizzes, Midterm-Exam, Final Exam
1.3	Explain the principles of sensing/actuation, data transmission and processing, visualization and analytics, as well as cyber security and privacy issues in IoT.	K2	Lectures, Small Group Work, Small Group Discussion	Quizzes, Midterm-Exam, Final Exam
2.0	**Skills**			
2.1	Evaluate model applicability, accuracy, and limitations	S1	Lectures, Small Group Work, Small Group Discussion	Quizzes, Midterm-Exam, Final Exam
2.2	Analyze, design, and implement a distributed IoT system, its components and address its connectivity issues.	S1, S4	Lectures, Small Group Work, Small Group Discussion	Quizzes, Midterm-Exam, Final Exam
...				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	IoT theory, concepts, components and delivery models	4
2.	IoT architecture and topologies	4
3.	Networking Basics and Socket Programming	4
4.	IoT Standards and Communication Models and Protocols	4

5.	Fundamentals of Localization, Aggregation, Clustering and Routing	4
6.	Sensors and Actuators in IoT	4
7.	Overview of Embedded OS	4
8.	IoT Architecture	4
9.	Issues and Challenges in building IoT applications	4
10.	Applications of RFID Technology	4
11.	IoT Security and privacy standards	4
12.	IoT in Context of Cloud Computing and Analytics	4
13.	IoT and Distributed Data Bases	4
14.	Connectivity, Identification and Localization for IoT and Augmented Reality	4
15.	Scripting Language for Embedded Systems	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz and Assignment	2, 4, 8	10%
2.	Midterm Examination	8th week	20%
3.	Project	12th week	20%
٤.	Final Examination	16th to 18th week	50%

*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	Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014. (ISBN-13: 978-0124076846).
Supportive References	1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1 stEdition, VPT, 2014. (ISBN-13: 978-8173719547) 2) 2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, Apress Publications, 2013. (ISBN-13: 978- 1430257400) 3. Distributed and Cloud Computing From Parallel Processing to the Internet of Things, Kai Hwang Jack Dongarra Geoffrey

	Fox; ISBN: 9780123858801, Morgan Kaufmann, October 2011 4. Daniel Minoli, Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications, John Wiley & Sons, 2013. **5.** IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT by David Etter
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture Rooms with 30 seats and a whiteboard or a smartboard.
Technology equipment (projector, smart board, software)	Desktop/ Laptop computer Multimedia Projector
Other equipment (depending on the nature of the specialty)	A File cabinet to keep Class Stuff, Markers, papers and student Files, and a printer to print program screenshots.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	- Indirect (questionnaire) - University online questionnaire for evaluation the course by students. - Observing the students' opinions recorded on the college student site. Appeal & suggestions box
Effectiveness of Students assessment	Peer reviewer	Direct (review of the quality of the exam done by the course coordinator)
Quality of learning resources	Faculty & students	Lecturers prepare and create the learning resources before the class begins and make them

Assessment Areas/Issues	Assessor	Assessment Methods
		more related to the course. Questionnaire
The extent to which CLOs have been achieved	Faculty	Student assessments reviewing
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**DEPARTMENT COUNCIL**
REFERENCE NO.	**14450824-0482-00014**
DATE	**5/3/2024**