جامعة الإسراء
ISRA UNIVERSITY

Course Syllabus

According to JORDAN National Qualification Framework (JNQF)

Course Name: Internet of Things Security

Course Number: 06043272

General Course Information:

Course title	**Internet of Things Security**
Course number	**06043272**
Credit hours	**3 hrs.**
Education type	**[Face-to-Face] 3**
Prerequisites/corequisites	**Web Design (1) 06013214**
Academic Program	**Computer Information System**
Program code	**604**
Faculty	**Information Technology**
Department	**Cyber Security**
Level of course	**3**
Academic year /semester	**4, 3**
Awarded qualification	**Bachelor**
Other department(s) involved in teaching the course	**None**
Language of instruction	**English**
Date of production/revision	**October 19, 2021**

Course Coordinator:

Coordinator's name	**Dr. Ahmad alshanty**
Office No	**4225**
Office Phone extension number	**2504**
Office Hours	**TBA**
Email	**ahmad.alshanty@iu.edu.jo**

Other Instructors:

Instructor name	**Dr. Ahmad alshanty**
Office No	**4225**
Office Phone extension number	**2504**
Office Hours	**TBA**
Email	**ahmad.alshanty@iu.edu.jo**

Course Description *(English/Arabic)*:

English	This course aims to introduce the concept of IoT and its impact on our daily lives, to understand the architecture and components of IoT. Introduction to IOT Security, IOT Ethics and Privacy. Building Automation and Security. Relevant Case Studies of IOT Security Vulnerabilities and Attacks, and Mitigation Controls. Use of IOT in Various Domains: Energy and Environment, Infrastructure Healthcare and Consumer Electronics. From this course, students will become aware of the cyber security issues raised by IoT and gain the knowledge of the related security techniques. Students will also gain hands-on experiences in building IoT devices and implementing security techniques.
Arabic	يهدف هذا المساق إلى التعريف بمفهوم إنترنت الأشياء وتأثيره على حياتنا اليومية ، لفهم بنية ومكونات إنترنت الأشياء. مقدمة لأمن IOT وأخلاقيات وخصوصية IOT. أتمتة المباني والأمن. دراسات حالة ذات صلة بمواطن الضعف والهجمات الأمنية ، وضوابط التخفيف. استخدام IOT في مجالات مختلفة: الطاقة والبيئة ، البنية التحتية للرعاية الصحية والإلكترونيات الاستهلاكية. من هذه الدورة ، سوف يصبح الطلاب على دراية بقضايا الأمن السيبراني التي أثارتها إنترنت الأشياء واكتساب المعرفة بتقنيات الأمان ذات الصلة. سيكتسب الطلاب أيضًا خبرات عملية في بناء أجهزة إنترنت الأشياء وتنفيذ تقنيات الأمان.

Textbook: *Author(s), Title, Publisher, Edition, Year, Book website.*

1. Qusay F. Hassan, Internet of Things A to Z: Technologies and Applications, Edition: 1, 2018, John Wiley & Sons

References: *Author(s), Title, Publisher, Edition, Year, Book website.*

1. 1- Inayat Ali, Sonia Sabir, Tim Kindberg, Zahid Ullah, Internet of Things Security, Device Authentication and Access Control: A Review, International Journal of Computer Science and Information Security (IJCSIS), Vol. 14, No. 8, August 2016

Course Educational Objectives (CEOs):

1.	**Outlines the main concepts of IoT, and its characteristics.**
2.	**Explain the interaction of IoT Architecture, Components, and layers.**
3.	**Compare different IoT protocols, networking, communication technologies, sensing and actuation on embedded platform.**
4.	**Apply IoT applications in different domains and analyze their performance**
5.	**Analyzing the challenges of IoT security and proposed solutions.**

Intended Learning Outcomes (ILO's):

1.	**Subject Intended learning outcomes (ILOs) describe what students are expected to know and be able to do at the end of the course. These outcomes are related to the knowledge, skill and competence that students acquire:**	**Relationship to CEOs**	**Contribution to PLOs**	**Bloom Taxonomy Levels***	**Descriptors****
2. A	**Knowledge and Understanding:**				
3. A1	**Define the key concepts of IOT and its characteristics by Providing real-life example.**	**1**	**a,c**	**1**	**K, C**
4. A2	**Illustrate the functionality of IOT components sensing and actuation on embedded platform, Architecture, layers and the interaction between them.**	**2**	**a,b**	**2**	**K, S**
5. A3	**Analyze the adoption IoT protocols, networking, communication technologies**	**3**	**b,c**	**4**	**C, S**
6. B	**Intellectual skills:**				
7. B1	**Examine the IoT applications based on the key concepts.**	**4**	**b**	**3**	**S**
8. B2					
9. B3					
10. C	**Subject specific skills:**				
11. C1	**Analyze the IoT security challenges and proposed solutions.**	**5**	**b,f**	**4**	**S**
12. C2					
13. C3					

14. D	**Transferable skills:**				
15. D1					
16. D2					
17. D3					

***Bloom Taxonomy Levels**

Level #	1	2	3	4	5	6
Level Name	Knowledge	Comprehension	Application	Analysis	Evaluation	Synthesis

**** Descriptor (National Qualification Framework Descriptors): K : Knowledge, S: Skill, C: Competency.**

Program Learning Outcome (PLOs):

Program Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviours that students acquire as they progress through the program. A graduate of the (_____) program will demonstrate:		Descriptors**		
		K	S	C
a.	Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	√		
b.	Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.		√	
c.	Communicate effectively in a variety of professional contexts.			√
d.	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.			√
e.	Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.			√
f.	Apply computer science theory and software development fundamentals to produce computing-based solutions. [IS]		√	
g.				
h.				
i.				
j.	.			
k.				

**** Descriptors according to the national qualifications framework (K: knowledge, S: skill, C: Competency)**

Weekly Schedule *(please choose the type of teaching)*

■ **Face to Face**

□ **Hybrid** ***(2 Lectures*** *Face – To - Face* ***+1 Lecture*** *Asynchronous)*

□ **Hybrid (*1 Lectures*** *Face – To - Face* ***+1 Lecture*** *Asynchronous)*

□ **Online** ***(2 Lectures*** *Synchronous* ***+1 lecture Asynchronous)***

Week	First Hour (*Face – To - Face*)	Second Hour (*Face – To - Face*)	Third Hour (*Face – To - Face*)	Ach. ILOs	Ach. PLOs	DS**
1	Course Plan, Regulations, Course Webpage. Introduction to IoT	Vision of IoT IOT definition Why IoT? What is going to happen? Enabling technologies of IOT IoT Enablers Characteristics of IoT	Applications domains What is expected to build IoT? Connectivity layers Baseline Technologies (M2M and WoT) Terminological Interdependence	A1	a,c	K,C
2	IoT Architecture	- How IoT Works? - Real-life Example	- IoT Applications - Advantages of IoT - Architecture of IoT	A1,A2	a,b,c	K,S,C

		- Prerequisites for learning IoT - Features of IoT	- IoT Components Components interactivity.			
3	Networking of IoT	- Expectations of IoT - Address Crunch - Connectivity - Building Blocks	- IoT network Configuration - Gateway Prefix Strategy Impact of Mobility on Addressing	A3	b,c	S,C
4	Sensing and Actuation	- Functionality - Definition - Sensor Node Components and Functionality - Real-life Sensors - Stimuli - Transducer vs Sensors	- Sensor features - Sensor Resolution. - Sensorial Deviations - Sensor Classifying (digital and analog) - Actuators.	A2	a,b	K,S
5	Basics of IoT Networking	- IoT components - Functional Components of IoT - IoT Implementation - IoT Interdependencies	- IoT Service Oriented Architecture - IoT Categories - IoT Gateways	A3	b,c	S,C
6	IoT and Associated Technologies Technical Deviations from Regular Web	IoT challenges IoT Considerations	Complexity of Networks Scalability.	A3	b,c	S,C
7	IoT Protocols	MQTT Protocol SMQTT protocol	CoAP protocol Protocols Enhanced Features	A3	b,c	S,C
8	Midterm Review	Midterm Exam	(Discuss Exam Results)	-	-	-
9	IoT Communication Technologies	Bluetooth	Zigbee	A3	b,c	S,C
10	Z-Wave	6LowPAN	WiFi	A3	b,c	S,C
11	IoT Applications	Smart Class Rooms	Smart Cities	B1	b	S
12	health Care	Smart Homes	presentations	B1	b	S
13	Smart Government	Smart wearable device	presentations	B1	b	S
14	IoT Security	Security overview	Security challenges for IoT	C1	b,f	S
15	Project	Review for Final Exam		-	-	-

** **DS (Descriptors) - K: Knowledge, S: Skills, C: Competency**

Development of ILOs is promoted through the following teaching and learning methods:

- **Interactive videos**
- **Practice Labs**
- **Discussion Forums**

- **Quizzes**
- **Other Interactive online activities**
- **Reports**

Teaching Methods and Assignments:

Course Policies:

A- Attendance policies:

The maximum allowed absences is 15% of the lectures.

B- Absences from exams and handing in assignments on time:

Midterm exam can be retaken based on approval of excuse by the instructor's discretion.

Not handing assignment on time will incur penalties.

C- Academic Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, and misbehaviour:

Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.

E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities (Course Videos, Practice labs, Discussion Forums, Quizzes) **30%**
- Midterm **20%**
- Final Exam **50%**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

Required equipment:

- **PC / Laptop with webcam and mic**
- **Internet Connection**
- **Access to the IU E-Learning Platform at: https://elearn.iu.edu.jo/**
- **E-learning plan**
- Satisfaction questionnaires for online and face-to-face learning
- Software for e-learning
- Training

Assessment Tools implemented in the course:

- ☑ Final Exam
- ☑ Midterm Exam
- ☑ Quizzes
- Homework
- Practice Labs
- Discussion Forums
- Periodic reports for learning assessment
- Improvement plans for online or face-to-face teaching

☑ Others: Project

Responsible Persons and their Signatures:

Course Coordinator	**Dr. Ahmad alshanty**	**Completed Date**	**14 / 6 / 2022**
		Signature	Dr.Ahmad Alshanty

Received by (Department Head)	**Dr. Hasan Kanaker**	**Received Date**	/ /
		Signature	