Mansoura University

Faculty of Computers and Information Sciences

Course Specifications of

Selected Topics in Computer Science – CS441P

University: Mansoura University **Faculty**: Computer and Information Sciences

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Program on which the course is given: Computer Science

Department offering the course: Department of Computer Science

Academic year/ Level: Forth Year / BSc Degree

Date of specification approval: January, 2018

A- Basic Information

Title : Internet of Things **Code :** CS414

Credit Hours : 3 **Lecture :** 2 **Project :** 1 **Practical :** 2

B- Professional Information

1- Overall Aims of the Course

This course aims to:

- Introduce students to the concepts and principles of the Internet of Things.
- Familiarize students with the multiple application areas of the new emerging technologies which enable the proliferation of smart things in all aspects of our life.
- Enable students to design, and implement smart things and add them to IoT platforms at the Edge-, Fog- and/or Cloud levels.

2- Intended Learning Outcomes of the course (ILOs)

By completing this course successfully, the student will be able to:

a- Knowledge and Understanding

a1. Understand the main IoTconcepts, fundamentals, professional standards, platforms, protocols, architecture and security

a3. Demonstrate an understanding of and ability to apply appropriate artificial intelligence techniques to create smart things.

a6. Understand the fundamental building blocks of the internet of things such as sensors, actuators, gateways, microcontrollers and network protocols and platforms.

b- Intellectual Skills

b1. Ability to specify, design and develop a smart things, which entails development, MCU programming, and connectivity.

b2. Perform comparisons between different IoT components, architectures, protocols and platforms.

b4. Evaluate the different smart things/systems and technologies such as embedded systems, sensors and actuators and their applications in smart homes, smart cities, precision agriculture, and Industry,and reflect on the processes that they follow as well as upon the solutions that they produce.

Critically evaluate ethical and potential security issues related to the Internet of Things **c-**

Professional and Practical Skills

c2. Design and implement of IoT systems with Ethernet, WiFi and BLE connectivity using standard application development tools.

Develop demonstration applications e.g. smartphone-based activity monitoring, automated irrigation system, environmental monitoring, smart home lighting control, etc.

Gain confidence in building intelligent systems through regular reinforcement and practice.

c4. Show an understanding and appreciation of professional issues and standards related to ethics and professional conduct, economics, and societal needs.

c5. Communicate effectively by oral and written means.

c13. Manage and execute IoT projects.

d- General and Transferable Skills d1. Demonstrate the ability of self-directed learning to manage one's own continuous learning.

d3. Use critical thinking skills to make decisions or evaluate possible IoT solutions to solve problems.

d7. Show the use of general IoT computing paradigms and facilities.

d8. Demonstrate an appreciation of the need to continue professional development in a continuously evolving field.

3- Contents

No	Course Content	Lecture	Lab	Project	Total
1	Introduction to the fundamental IoT concepts.	2	2		4
2	IoT Reference Architecture	4	-		4
3	IoT Hardware such sensors, actuators, microcontrollers and gateways	8	8	24	40
4	Sensor data analytics	6	8		
5	Iot Platforms, IoT protocols and Security	6	6		12
	Total Hours	24	24	24	60

4- Assessment Schedule

Assessment Method	No.	Description	Week No.	Weight (%)
Assignment	1	Sheet no. 1	4	5
Written Exams	2	Midterm Exam	7	10
Assignment	3	Sheet no. 2	8	5
Oral Exam	4	Oral questions	14	10
Practical Exam	5	Project	14	10
Written Exams	6	Final Exam	14	60
Total				100

5- List of references

1. **The Internet of Things**
   Enabling Technologies, Platforms, and Use Cases
   Author: Anupama C. Raman, Pethuru
   RajISBN10:1498761283Year:2017 CRC Press

2. **Building Arduino Projects for the Internet of Things 2016**
   Experiments with Real-World Applications by Adeel Javed
   ISBN-10:1484219392, Apress.

3. **Internet of Things with ESP8266**
   Build amazing Internet of Things projects using the ESP8266 WiFi chip
   Author: Marco Schwartz,ISBN-10:1786468026 Year:2016, PACKT.

5.1 Course Notes

- Lecture notes and demo videos uploaded to the learning content management system Moodle.

5.2 Essential Books (Text Books)

The Internet of Things: Enabling Technologies, Platforms, and Use Cases Author: Anupama C. Raman, Pethuru Raj, ISBN-10:1498761283, Year:2017 CRC Press.

6- Facilities Required for Teaching and Learning -

Data show.

- Speakers for audio and video files used to practice listening.

Course Content/ILO Matrix

Course Content	a1	a3	a6	b1	b2	b4	c2	c4	c5	c13	d1	d3	d7	d8
Introduction to the fundamental IoT concepts.	•		•						•					
IoT Reference Architecture		•		•	•	•	•			•	•	•		•

IoT Hardware such sensors, actuators, microcontrollers and gateways	•		•				•	•					•	
Iot Platforms, IoT protocols and Security	•		•	•	•	•	•	•		•		•	•	

Learning Method/ILO Matrix

Course Content	a1	a3	a6	b1	b2	b4	c2	c4	c5	c13	d1	d3	d7	d8
Lectures	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Practice/Labs					•	•	•	•	•	•	•	•	•	•

Assessment Methods/ILO Matrix

Assessment	a1	a3	a6	b1	b2	b4	c2	c4	c5	c13	d1	d3	d7	d8
Assignment	•	•	•					•		•	•	•	•	•
Midterm Exam	•	•	•	•	•	•	•		•					
Oral exam	•	•	•					•	•	•	•	•	•	•
Practical Exam		•	•	•			•		•					
Final Exam	•	•	•	•	•	•	•		•				•	

Course Coordinator: Prof. A.S. Tolba
Head of Department: Prof. A. S. Tolba
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