National University of Computer & Emerging Sciences

FAST School of Computing

IO4041: Introduction to Internet of Things

Spring 2024

Course Information

Program: BS
Credit hours: 3
Type: Elective
Class meeting time: as per timetable

Course website: Google Classroom
Class Venue: New Building
Pre-requisites: CS3001 Computer Networks

Course Instructor

Dr. Ammar Haider

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Office # 26 First Floor, New Building

Course TA: to be advised

Course Learning Outcomes

The course is designed to provide students with a solid theoretical and technical introduction to the Internet of Things (IoT). Upon completion of this course, students should be able to:

1. understand the basic ecosystem and architecture of the Internet of Things (IoT) systems.
2. explain the key enabling technologies for developing IoT applications.
3. provide overview of wireless connectivity standards and underlying protocols for IoT applications.
4. introduce devices including sensors, low power processors, gateways, and cloud computing platforms.
5. design and develop a prototype IoT application involving both hardware and cloud elements.

Course Textbook

There isn't a single textbook that covers the whole course contents. Following reference texts will be used:

- IoT and Edge Computing for Architects, 2nd edition, by Perry Lea. Packt.
- Introduction to IoT, by Sudip Misra, Anandarup Mukherjee, Arijit Roy. Cambridge University Press.
- Arduino Sketches: Tools and Techniques for Programming Wizardry, James A. Langbridge. Wiley.

In addition, some research articles will be shared during the course.

Tentative Course Contents

Topics	No. of Lectures
Introduction and Overview Elements of IoT ecosystem IoT applications Review of Computer Networks: TCP/IP	2
IoT Hardware Sensors Energy Sources Actuators Microcontrollers	1
IoT Software Arduino programming and hardware interfacing Raspberry Pi programming	3
Application Layer Request-response and Publish-Subscribe models MQTT, CoAP protocols	2
IoT Communication Technologies Communication patterns Zigbee, Bluetooth, WiFi	3
Network Layer 6LoWPAN, Thread Mesh Networking Routing in IoT networks	3
Transport Layer Reliable Transport protocols for WSNs	1
Edge Computing	1
Data Analytics & Machine Learning	1
IoT Security	1
Project presentations	3

Tentative Evaluation Plan

Assignments	7.5%
Quizzes	10%
Mid Terms	25%
Project	12.5%
Final Exam	45%

Grading Policy: Absolute grading

Notes

- Course outline may change 10-20% as we proceed in the semester.
- Assignment deadlines are hard.
- Integrity in the assignments/quizzes is expected; otherwise result would be an F grade in the course or the case may be forwarded to the Disciplinary Committee.
- (80%) Attendance for the student is a MUST which needs to be ensured according to the University policy to avoid disqualification.