# UNIVERSITY OF MAURITIUS

## COL Workshop 3 & 4 April 2018

## STORYBOARD OF COURSE 'IOT & CLOUD COMPUTING' 3-credit module

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### A. OVERVIEW OF MODULE

This module provides an overview of the Internet of Things (IoT) and Cloud Computing concepts, infrastructures and capabilities. This will help students gain the necessary knowledge to construct IoT systems and use cloud services for processing and storage of the data produced by the IoT devices. Emphasis will be placed on the architecture and design of IoT systems, the different technologies (wireless/mobile/sensor) governing system implementation and the migration of the data to the Cloud for processing.

**Prerequisite**: This course requires learners to have prior knowledge of programming in Java.

### B. COURSE AIMS

This module aims to develop knowledge and critical understanding of the underlying principles of Cloud Computing and IoT systems, and the commercial and business implications of technical advances in this area. Students will gain practical experience in the development of Cloud-based IoT systems and exposure to appropriate hardware and software platforms that underpin such development.

### C. LEARNING OUTCOMES

By the end of the course, you are expected to be able to:

1. Describe the IoT and Cloud architectures
2. Determine the right sensors and communication protocols to use in a particular IoT system.
3. Deploy Cloud Services using different cloud technologies.
4. Implement cloud computing elements such virtual machines, web apps, mobile services, etc.
5. Establish data migration techniques from IoT devices to the cloud.

6. Implement security features to protect data stored in the cloud.
7. Use visualisation techniques to show data generated from the IoT device.

## D. PROPOSED OUTLINE OF COURSE

This course is divided into 4 modules, namely:

1. Introduction to IoT and Cloud
2. Internet of Things
3. Cloud Computing
4. Application of IoT and Cloud

### Module 1: Introduction to IoT and Cloud

Topic 1: Trends of Computing

Topic 2: Introduction to IoT

### Module 2: Internet of Things

Topic 1: IoT Architectures

Topic 2: IoT Devices and Sensors

Topic 3: IoT communication and protocols

### Module 3: Cloud Computing

Topic 1: Cloud Computing Fundamentals

Topic 2: Cloud Computing Architectures

Topic 3: Cloud Types and Services

Topic 4: Virtualization and Resource Management

### Module 4: Application of IoT and Cloud

Topic 1: IoT and cloud integration

Topic 2: Application development and cloud processing

Topic 3: Security and Privacy for IoT/Cloud Computing

| Module | Author/s | Indicative learning outcomes | Indicative Activities, time frame & purpose – weightage for CA | Media/Video | Timeframe |
|---|---|---|---|---|---|
| Module 1: Introduction to IoT & Cloud | Mr A Chiniah | 1. Define the terms IoT and Cloud Computing<br>2. Describe the evolution that has led to Cloud Computing<br>3. Discuss the importance of IoT Devices | Quiz (1 week) – 2.5%<br>Essay (1 week) – 10% | **Video** introducing the course and different modules & expectations from learners | Weeks 1-2 |
| Module 2: Internet of Things | Mr A Chiniah<br><br>&<br><br>Mr S Jaunbuccus | 1. Illustrate the Components that forms part of IoT Architecture<br>2. Determine the most appropriate IoT Devices and Sensors based on Case Studies.<br>3. Illustrates the connections between the Devices and Sensors.<br>4. Choose the appropriate protocol for communication between IoT Systems | Quiz (1week) – 2.5%<br>Essay (1 week) – 10%<br>Assignment – Part 1 (3 weeks) – 20% | Video guiding the set-up and configuration of IoT modules | Weeks 3-5 |
| Module 3: Cloud Computing | Mr A Chiniah | 1. Describe the different Cloud Architectures<br>2. Differentiate between the different types of Cloud Systems<br>3. Assess the different categories of Services provided by Cloud Providers.<br>4. Deploy Virtual Machines | Quiz (1week) - 2.5%<br>Essay (1 week) - 10%<br>Assignment – Part 3 (3 weeks) – 15% | Video guiding the usage of Hadoop and MapReduce.<br><br>(VM provided) | Weeks 6-9 |

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| | | 5. Assign Resources to Virtual Machines<br>6. Implement Load Balancing between VMs. | | | |
| Module 4: Application of IoT & Cloud | Mr S Jaunbuccus | 1. Establish data migration techniques from IoT devices to the cloud.<br>2. Analyse Case Studies, and develop IoT solutions and implement Cloud Services.<br>3. Use visualisation techniques to show data generated from the IoT devices. | Quiz (1week) - 2.5%<br>Essay (1 week) - 10%<br>Assignment – Part 2 (3 weeks) – 15% | Video guiding the setup of platform and connection with IoT Devices | Weeks 10-12 |

**E: ASSESSMENT**

There are no examinations; course is fully assessed by Coursework as specified below:

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| Assignment (main) | 50% |
| Activities | 40% |
| Online participation | 10% |
| Total | 100% |

| **Coursework** | | **Weightage** |
|---|---|---|
| 1. Main Assignment | Report with codes and screenshot:<br>1- IoT module implementation<br>2- Working with Big Data<br>3- Upload and analysing data from IoT Device<br>Detailed assessment criteria to be prepared for students, given that the weightage is high | **50%** |
| 2. Activities | Essay on topics related to the content covered in the module to enhance the knowledge in that particular module. | **40%** |
| 3. Online Participation | Quiz after each module/topic to assess understanding. | **10%** |
| | | |
| **Total Percentage** | | **100** |

## F. PROPOSED COURSE MAP

| Week | Module | Topic | Activities to be completed |
|---|---|---|---|
| 1 | 1 | Trends of Computing | Quiz 1 |
| 2 | 1 | Introduction to IoT | Essay 1 |
| 3 | 2 | IoT Architectures | Quiz 2 |
| 4 | 2 | IoT Devices and Sensors | Essay 2 |
| 5 | 2 | IoT communication and protocols | Assignment Part 1 |
| 6 | 2 | Cloud Computing Fundamentals | Quiz 3 |
| 7 | 3 | Cloud Computing Architectures | Essay 3 |
| 8 | 3 | Cloud Types and Services | Assignment Part 2 |
| 9 | 3 | Virtualization and Resource Management | Assignment Part 2 (cont) |
| 10 | 4 | Topic 1: IoT and cloud integration | Quiz 4 |
| 11 | 4 | Application development and cloud processing | Essay 4 |
| 12 | 4 | Security and Privacy for IoT/Cloud Computing. | Assignment Part 3 |
| 13 | | | Finalising & Submitting Main Assignment |
| 14 | | Summing up Modules 1 & 2 | Feedback on Activities of Modules 1 & 2 |
| 15 | | Summing up Modules 3 & 4 | Feedback on Activities of Modules 1 & 2 |