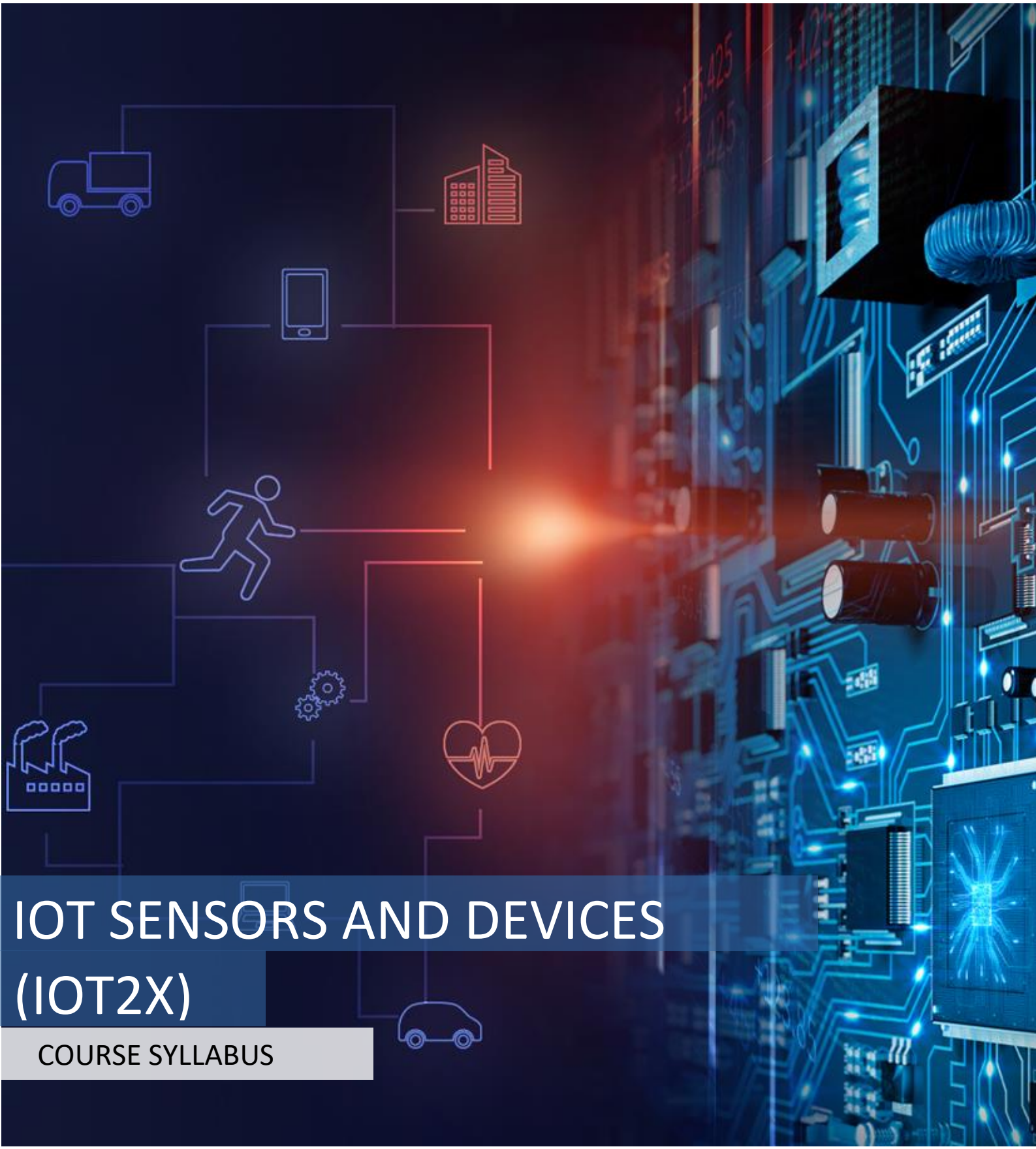

IOT SENSORS AND DEVICES (IOT2X)

COURSE SYLLABUS

MicroMasters in the Internet of Things (IoT)

Welcome

Welcome to **IOT2x - IoT Sensors and Devices**, the second course in our MicroMasters in the Internet of Things program.

Complete, pass and earn a Verified Certificate in all six courses to receive your MicroMasters Credential.

- IOT1x - Introduction to the Internet of Things (IoT)
- **IOT2x - IoT Sensors and Devices - *this course!***
- IOT3x - IoT Networks and Protocols
- IOT4x - IoT Programming and Big Data
- IOT5x - Cybersecurity and Privacy in the IoT
- IOT6x - IoT Capstone Project

Entry Pathways

Successful completion of all six verified courses and attainment of the MicroMasters in IoT provides an entry pathway into **either one** of the following Masters programs:

- The Master of International Business and Entrepreneurship degree program at Curtin University. Subject to meeting Curtin's admission criteria, you will receive 100 credits (25%) towards the 400 credit Master of International Business and Entrepreneurship degree program.

  OR

- The Master of Engineering Science (Electrical Engineering) degree program at Curtin University. Please note that the Masters of Engineering Science also requires applicants to have a Bachelor of Engineering degree. Subject to meeting Curtin's admission criteria, you will receive 100 credits (25%) towards the 400 credit Master of Engineering Science (Electrical Engineering) degree program.

IOT2x – IoT Devices and Sensors

Course Description:

The Internet of Things (IoT) is expanding at a rapid rate, and it is becoming increasingly important for professionals to understand what it is, how it works, and how to harness its power to improve your business.

IOT2x is for practical learners who want to explore and interact with the IoT bridge between the cyber- and physical worlds, in order to create efficiencies or solve business problems.

In this course, you will learn about the 'things' that get connected in the Internet of Things to sense and interact with the real world environment – from something as simple as a smoke detector, to a robotic arm in manufacturing. If we consider the IoT as giving the internet the ability to feel and respond, this course is about the sensors that feel and the devices that respond.

We will look at IoT sensors, actuators and intermediary devices that connect things to the internet, as well as electronics and systems, both of which underpin how the Internet of Things works and what it is designed to do.

Course Objectives:

In this course you will:

- Identify the sensors and other devices needed for different IoT solutions;
- Learn basic electronic design as applied to IoT sensors and embedded controllers;
- Understand and map out an IoT system incorporating specific devices.

Pre-Requisites:

There are no pre-requisites for this course, however if you intend to apply for the MicroMasters in the Internet of Things credential, you will need to successfully complete all six IOTx verified courses to gain the certificate.

Time Commitment:

4 - 6 hours per module.

Your Instructors:

Professor Iain Murray, AM
Iain is an academic in the School of Electrical Engineering, Computing and Mathematical Sciences at Curtin University, specialising in networking, embedded systems and assistive technology. He received his B.Eng(Hons) and Ph.D. in Computer Systems Engineering from Curtin in 1998, and 2008, respectively. He is a Curtin Academy Fellow and was appointed a Member of the Order of Australia for his contributions to education in 2016.

Associate Professor Cesar Ortega-Sanchez
Cesar is a Computer Systems Engineer from the Metropolitan Autonomous University in Mexico. He obtained the degree of Master of Science in Digital Systems from Brunel University and the degree of Doctor of Philosophy in Electronics from the University of York, both in the UK.

He joined Curtin University in 2005 as Senior Lecturer of the Electrical and Computer Engineering Department where he taught courses in digital design and embedded systems. More recently he has taken leading roles in teaching and learning at Department and Faculty levels. He is currently Academic Lead of the Engineering Foundation Year, the common first year of engineering serving 700+ student engineers. He has supervised over 100 undergraduate and postgraduate theses and has published over 60 papers on Electronics and Engineering Education. His research interests are in embedded systems, bio-inspired architectures, intelligent systems, assessment and curriculum design. In 2015 he won a citation from the Australian Office of Learning and Teaching for his outstanding work facilitating activities to improve students' employability skills.

Dr Lenin Gopal
Lenin is a Senior Lecturer in the Department of Electrical and Computer Engineering, Curtin Sarawak campus. He obtained his PhD degree from Curtin University, Australia. Prior to joining Curtin Sarawak Malaysia, he has had more than fifteen years of teaching experience in India and Malaysia. His recent position was Assistant Professor in the Department of Electronics and Communication Engineering, Bharathiyar College of Engineering and Technology, Pondicerry, India.

Course Syllabus:

This course consists of five modules. We estimate that you will need to spend at least **4-6 hours per week** on each module. Course content will be released week by week once the course begins.

Module 1: Electrical circuits and electronics

- Describe how electronic devices fit with the Internet of Things, and why they are important;
- Have a basic understanding of Ohm's law and the principles of electricity;
- Have a basic understanding of electronic components, both active and passive;
- Understand the difference between analogue and digital signals.

Module 2: End of the line things

- Differentiate between different sensor types and application areas for a selected range of sensors and actuators;
- Demonstrate the ability to incorporate sensors and actuators into a circuit;
- Have a basic understanding of microcontrollers/Arduino and communication protocols.

Module 3: Intermediary devices, the internet capable link

- Select a microcontroller based on a set of requirements;
- Specify and select communication protocols dependent on a set of requirements;
- Understand microcontroller to microcontroller communication;
- Understand microcontroller to computer/Cloud communication;
- Differentiate between Fog, Edge, and Cloud processing.

Module 4: Processes and systems

- Understand the concept of both open loop and closed loop systems;
- Identify inputs, outputs, control and feedback for a system;
- Describe the different ways that systems are controlled;
- Design a basic IoT system.

Module 5: Summary and assessment

- Consider design implications for sensors and devices;
- Use Tinkercad and Packet Tracer to solve IoT problems.

Assessment Summary:

In order to successfully complete this course, you must gain an overall mark of **70% or higher.**

This course consists of ten short assessments (4 module quizzes; a final quiz; 4 Tinkercad ® tasks; 1 Packet Tracer task) as outlined below. You can find further details about assessment requirements within the **Assessment** section of the course.

#	Assessment Type	% of Final Grade	Due Date
A1	Module quizzes (x 4)	4 x 10% = 40%	Monday, 18 June 2018 *(09.00 UTC)*
A2	Final quiz	10%	Monday, 18 June 2018 *(09.00 UTC)*
A3	Peer-marked practical Tinkercad® tasks (x 4)*	4 x 10% = 40%	Monday, 18 June 2018 *(09.00 UTC)*
	**Grade the Tinkercad® task assessments of at least 3 (three) other learners*		*Between 18 June 2018 (09.00 UTC) and 25 June 2018 (09.00 UTC)*
A4	Practical Packet Tracer task	10%	Monday, 18 June 2018 *(09.00 UTC)*

***Important:** To receive your grade for 'Assessment 3: Peer-marked practical Tinkercad® tasks', you must also grade the submissions of **3 (three)** other learners. If you do not grade 3 other learners, you will forfeit your grade (worth up to 40%) for the Tinkercad activities.

Peer review of Assessment 3 Tinkercad® tasks

Please be aware that the four Tinkercad® tasks to be completed for Assessment 3 are set up as peer assessments, which means that they will be reviewed and marked by other learners within the course.

After you have completed and submitted your own Tinkercad® assessment, you will need to mark the Tinkercad® assessments submitted by **3 (three)** other learners in your class BEFORE receiving your own assessment mark. This means that you may need to wait for a week or two to get your assessment results. Your final mark for the Tinkercad® assessment will be the median of the three grades that you receive.

The peer review process will allow you to reflect on your own assessment submission and will also provide you with the opportunity to see the work that other learners have submitted.

When marking the other learners' assessments, you will be provided with a rubric (marking guide) which you can use to assess the quality of the assessment you are grading. The rubric provides details of the different levels and marks assigned to the assessment criteria.

More information about the peer assessment process (also called an 'ORA', or Open Response Assessment by edX) is available here:
http://edx.readthedocs.io/projects/edx-guide-for-students/en/latest/SFD_ORA.html

Please note: Both audit and verified learners will participate in the peer review process. If verified learners have any issues with their peer assessment grade, they may contact the instructor to discuss it.

Course Schedule:

Module	Topic	Assessment
1	Electrical circuits and electronics	Module 1 quiz
2	End of the line things	Module 2 quiz
3	Intermediary devices, the internet capable link	Module 3 quiz
4	Processes and systems	Module 4 quiz
5	Summary and assessment	Final quiz Practical assessment tasks in Tinkercad® and Packet Tracer