1. **Title of the module**

COMP6570 (CO657) – Internet of Things

1. **Division or partner institution which will be responsible for management of the module**

 Division of Computing, Engineering, Mathematical Sciences (CEMS)

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

Level 6

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Autumn or Spring

1. **Prerequisite and co-requisite modules**

Pre-requisites:

COMP3200 Introduction to Object-oriented Programming,

COMP5200 Further Object-oriented Programming,

COMP3230 Databases and the Web,

COMP3240 Computer Systems or COMP5270 Operating systems and architecture or COMP5570 Computer Systems.

1. **The courses of study to which the module contributes**

Optional module for Canterbury campus students on the BSc Computer Science (all variants), BSc Computing and BSc Software Engineering courses including industry variants and joint honours students with Computer Science.

1. **The intended subject specific learning outcomes.
On successfully completing the module students will be able to:**
	1. Describe the technologies used for the Internet of Things, including (passive and active) sensors, actuators, the physical communications layer, communications protocols, programming frameworks, and an understanding of energy and bandwidth constraints.
	2. Design and implement software for Internet of Things applications, including both low-level firmware on embedded devices and higher-level data processing for data obtained from sensors.
	3. Design and build a simple sensor network based on Internet of Things technology.
	4. Discuss and make informed comments on research into, and application areas of, the Internet of Things, including an understanding of the commercial context.
2. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**
	1. Communicate their understanding of technical problems and their solutions
	2. Manage their time and resources effectively.
3. **A synopsis of the curriculum**

The module will cover a mixture of theoretical and practical topics in the area of the Internet of Things (IoT), that is, the use of Internet technologies to access and interact with objects in the physical world. This will include coverage of the range of sensor and actuator devices available, ways in which they communicate and compute, methods for getting information to and from IoT-enabled devices, and ways of visualising and processing data gained from the IoT. A practical component will consist of building the hardware and software for a sensor network and a system to collect, process and visualise data from that network.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

Atzori, L., Iera, A., Morabito, G. (2010) The Internet of Things: A Survey. Computer Networks, 54(15),2787-2805.
Fell, M. (2014) *Roadmap for the Emerging “Internet of Things”*, Carré and Strauss.
Kortuem, G et al. (2010). *Smart objects as building blocks for the Internet of things*. IEEE Internet Computing*,* 14(1):44-51.
Welbourne, E et al. (2009). *Building the Internet of Things Using RFID*. IEEE Internet Computing*,* 13(3):48—55.

Fernandes, E., Jung, J., & Prakash, A. (2016, May). *Security analysis of emerging smart home applications*. In Security and Privacy (SP), 2016 IEEE Symposium on (pp. 636-654). IEEE.

Al-Fuqaha, A., Guizani, M., Mohammadi, M., Aledhari, M. and Ayyash, M. (2015). *Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications*. IEEE Communications Surveys & Tutorials, 17(4), pp.2347-2376.

1. **Learning and teaching methods**

Total contact hours: 38 hours

Private study hours: 112 hours

Total study hours: 150 hours

1. **Assessment methods**
	1. Main assessment methods

100% coursework, composed of:

A1- Simple embedded programming (individual) (15%)

A2 - IoT System (individual or groups of 2 students)

 A2.1 – Concept poster (10%)

 A2.2 – IoT Device video (10%)

 A2.3 – IoT System final (65%)

13.2 Reassessment methods

Reassessment Instrument: 100% coursework

1. ***Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *8.1* | *8.2* | *8.3* | *8.4* | *9.1* | *9.2* |
| **Learning/ teaching method** |  |  |  |  |  |  |
| **Private Study** | X | X | X | X | X | X |
| Lectures | X | X | X | X |  |  |
| Seminars |  | X | X | X | X |  |
| **Assessment method** |  |  |  |  |  |  |
| A1 – Simple embedded programming |  | X | X |  |  | X |
| A2.1 – Concept poster | X |  |  | X | X | X |
| A2.2 – IoT Device video | X | X | X | X | X | X |
| A2.3 – IoT System final | X | X | X | X | X | X |

1. **Inclusive module design**

The Division recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **Internationalisation**

The topics addressed by this module relate to a field which is of international importance, given the global role of computers in today's technological innovation. The topics covered by this module are international in nature, being identical worldwide and independent of traditional spoken language.

**DIVISIONAL USE ONLY**

**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 10/12/2020 | Minor | September 2021 | 6,7 | No |
| 23/09/2021 | Minor | September 2021 | 13.1 | No |
| 19/11/2021 | Minor | September 2022 | 13, 14 | No |