



## MODULE SPECIFICATION

| Part 1: Information       |  |                    |  |
|---------------------------|--|--------------------|--|
| Module Title              | Mobile and Embedded Devices                                      |                    |  |
| Module Code               | UFCFW5-30-2  | Level              | Level 5                                    |
| For implementation from   | 2018-19  |                    |  |
| UWE Credit Rating         | 30   | ECTS Credit Rating | 15   |
| Faculty                   | Faculty of Environment & Technology                              | Field              | Computer Science and Creative Technologies |
| Department                | FET Dept of Computer Sci & Creative Tech                         |                    |  |
| Contributes towards       |  |                    |  |
| Module type:              | Standard   |                    |  |
| Pre-requisites            | Computer and Network Systems 2018-19, Programming in C++ 2018-19 |                    |  |
| Excluded Combinations     | None   |                    |  |
| Co- requisites            | None   |                    |  |
| Module Entry requirements | None   |                    |  |

| Part 2: Description   |
|---|
| <p><b>Overview:</b> Pre-requisites: students must take one out of UFCF93-30-1 Computer and Network Systems or UFCFGL-30-1 Programming in C++</p> <p><b>Educational Aims:</b> See Learning Outcomes.</p> <p>In addition, the educational experience may explore, develop, and practise but not formally discretely assess the following:</p> <p>Working as a member of a team.</p> <p><b>Outline Syllabus:</b> The syllabus includes:<br/>           History of mobile devices.<br/>           Architecture of low powered mobile system, exemplified by the ARM-Cortex-M3 processor.<br/>           Advanced architectures, exemplified by ARM-Cortex A9<br/>           The nature of security in embedded and network systems<br/>           Cross development and cross compilation<br/>           Booting embedded systems</p> |

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JTAG - controlling dead or locked systems - system initialisation, security implications  
Memory technologies at the device level - Flash, SD  
Networking technologies - wired and wireless  
Configuring and building embedded OS  
File systems for embedded systems on a range of devices  
Open source development methodologies. Working in OS communities, responsibilities, professionalism and legal implications.  
Embedded OS - Linux kernel programming, Linux kernel modules, security concerns  
Embedded OS – Android: architecture, programming, security concerns  
Reliability of mobile data – jamming devices  
File Systems - secure and journaling file systems  
Power saving features of mobile and embedded systems: Booting, suspending, sleeping and hibernating  
Mobile wireless technology: Wireless and GPS.

**Teaching and Learning Methods:** For the most part the course will be delivered through practicals and lectures. The theoretical content will be covered in lectures. In the practical sessions students will gain understanding through designing, implementing, analysing and investigating mobile systems and/or simulations of mobile systems. Students will be expected to work in groups and, as part of the learning process, to present their work to their peers. The practical sessions will be delivered in such a way that the student is able to focus on activities that most closely align with their degree programme.

The module delivering will therefore include:

Scheduled learning - lectures, demonstrations, practical classes and workshops;

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion etc.

The lecture series will be supported by weekly practical sessions in which the students have the opportunity to apply some of the concepts discussed during the lecture series. The practicals will allow the students to explore and debug mobile devices and/or device simulations using a range of tools.

Contact Hours:

This module will involve 6 hours contact time per fortnight. The time will be divided between lecture sessions and laboratory sessions.

Module contact time = 72 hours

Over the course of the academic year students should expect to spend approximately:

Activity

Contact time: 72 hours

Assimilation and development of knowledge: 148 hours

Exam preparation: 40 hours

Coursework preparation: 40 hours

Total study time: 300 hours

### Part 3: Assessment

In common with many modules that form part of a computing degree, this module aims to equip students with a theoretical understanding that will underpin their mastery of a set of practical skills. In this way, students will be able to extend their practical skills, transfer them to alternative tools and reflect on problems that arise as those skills are applied. The assessment strategy reflects this overarching aim in that students are assessed by examinations and by a piece of practical work.

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| First Sit Components                       | Final Assessment | Element weighting | Description   |
|--|------------------|-------------------|---|
| Practical Skills Assessment - Component B  |                  | 25 %              | Group practical work 1  |
| Practical Skills Assessment - Component B  |                  | 25 %              | Group practical work 2  |
| Examination - Component A                  |                  | 25 %              | Examination (2 hours)   |
| Examination - Component A                  | ✓                | 25 %              | Examination (2 hours)   |
| Resit Components                           | Final Assessment | Element weighting | Description   |
| Professional Practice Report - Component B |                  | 50 %              | Practical development and software and supporting documentation |
| Examination - Component A                  | ✓                | 50 %              | Examination (2 hours)   |

| Part 4: Teaching and Learning Methods |  |     |
|---------------------------------------|--|-----|
| Learning Outcomes                     | On successful completion of this module students will be able to:                          |     |
|                                       | <b>Module Learning Outcomes</b>  |     |
|                                       | MO1 Understand the characteristics of memory in low-powered mobile and embedded technology |     |
|                                       | MO2 Analyse and manipulate higher-level software architectures, file systems and memory    |     |
|                                       | MO3 Develop software for mobile and embedded devices for a range of purposes               |     |
|                                       | MO4 Explore booting and system initialisation in a range of devices                        |     |
|                                       | MO5 Appraise the role of device drivers in mobile and embedded systems                     |     |
| Contact Hours                         | <b>Contact Hours</b>   |     |
|                                       |  |     |
|                                       | <b>Independent Study Hours:</b>  |     |
|                                       | Independent study/self-guided study  | 228 |
|                                       | <b>Total Independent Study Hours:</b>  | 228 |
|                                       | <b>Scheduled Learning and Teaching Hours:</b>  |     |
|                                       | Face-to-face learning  | 72  |

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|              |   |     |
|--------------|---|-----|
|              | <b>Total Scheduled Learning and Teaching Hours:</b>   | 72  |
|              | <b>Hours to be allocated</b>  | 300 |
|              | <b>Allocated Hours</b>  | 300 |
| Reading List | <p><i>The reading list for this module can be accessed via the following link:</i></p> <p><a href="https://uwe.rl.talis.com/modules/ufcfw5-30-2.html">https://uwe.rl.talis.com/modules/ufcfw5-30-2.html</a></p> |     |