# MODULE SPECIFICATION

| Part 1: Information | | | |
|---|---|---|---|
| Module Title | Safety Critical Embedded Systems | | |
| Module Code | UFMF7D-15-M | Level | Level 7 |
| For implementation from | 2018-19 | | |
| UWE Credit Rating | 15 | ECTS Credit Rating | 7.5 |
| Faculty | Faculty of Environment & Technology | Field | Engineering, Design and Mathematics |
| Department | FET Dept of Engin Design & Mathematics | | |
| Contributes towards | Digital Electronic Systems Engineering {Apprenticeship} [Jan][PT][Frenchay][2yrs] MSc 2018-19 | | |
| Module type: | Standard | | |
| Pre-requisites | None | | |
| Excluded Combinations | None | | |
| Co- requisites | None | | |
| Module Entry requirements | None | | |

## Part 2: Description

**Educational Aims:** See Learning Outcomes

In addition, the educational experience may explore, develop, and practise but not formally assess the following:

Understanding of the need for high-level professional and ethical conduct.

**Outline Syllabus:** The syllabus includes:

Real Time Programming:
The use of a compiled high level language (for example C) to effect processing and decision-making in a realtime system.
Use of language subsets for safety critical systems eg MISRA C.

Use of development tools to support best practice, such as IDEs (Integrated Development Environments), version control systems, bug and change tracking
Design methodologies and techniques for embedded development e.g. UML for real-time systems. Design for debug, user interface design.
Use of a real-time executive.

Safety Critical Design:
Hazard analysis techniques
Examination of robust design, failure tolerance and failure recovery
Use of Standards such as DO-178B, IEC61508
High level design tools, auto generation of code

**Teaching and Learning Methods:** See Assessment

**Part 3: Assessment**

The module will be assessed in two components.

(Component A): Research an embedded systems failure reported through an individual presentation.

(Component B): Demonstration of an innovative solution to a design problem along with submission of a log book.

Formative assessment will be provided as oral feedback throughout the laboratory sessions particularly with respect to the design development and the log-book entries.

Students will also be assessed in their effective use of the test and verification tools, the quality of their programme design and documentation.

Formative feedback will be provided during the laboratory sessions and tutorials.

| First Sit Components | **Final Assessment** | **Element weighting** | **Description** |
|---|---|---|---|
| Report - Component B | | 75 % | Logbook showing development process and demonstration of final product |
| Presentation - Component A | ✓ | 25 % | Oral presentation |
| Resit Components | **Final Assessment** | **Element weighting** | **Description** |
| Set Exercise - Component B | | 75 % | Design exercise and demonstration |
| Presentation - Component A | ✓ | 25 % | Oral presentation |

**Part 4: Teaching and Learning Methods**

Learning Outcomes

On successful completion of this module students will be able to:

| | **Module Learning Outcomes** |
|---|---|
| MO1 | Investigate a problem and define constraints relating to safety, risk and environmental issues through the use of relevant techniques |
| MO2 | Apply modelling techniques to evaluate the performance of embedded systems |
| MO3 | Utilise concepts from outside of engineering and apply them to engineering problems |
| MO4 | Show awareness of relevant legal and ethical requirements relating to safety and the ability to evaluate risks |
| MO5 | Demonstrate a thorough understanding of current practice in embedded system design |
| MO6 | Awareness of developing technologies related to the of safety critical embedded systems |

Contact Hours

| **Contact Hours** | |
|---|---|
| | |
| **Independent Study Hours:** | |
| Independent study/self-guided study | 126 |
| **Total Independent Study Hours:** | 126 |
| **Scheduled Learning and Teaching Hours:** | |
| Face-to-face learning | 24 |
| **Total Scheduled Learning and Teaching Hours:** | 24 |
| **Hours to be allocated** | 150 |
| **Allocated Hours** | 150 |

Reading List

*The reading list for this module can be accessed via the following link:*

https://uwe.rl.talis.com/modules/ufmf7d-15-m.html