MODULE SPECIFICATION

Part 1: Information			
Module Title	Embedded Systems Development		
Module Code	UFCF6Y-30-3	Level	Level 6
For implementation from	2020-21		
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		
Module type:	Standard		
Pre-requisites	C++ Development 2020-21		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: This module will pursue a practical approach as far as consistent with the essentially abstract process of the design process.

Outline Syllabus: The syllabus includes:

A group design & build project will require students to organize and manage themselves into effective teams.

This will involve: arranging and holding regular meetings, time planning, work allocation, document production, analytical review of the development process.

Concurrent Systems: Intellectual simplicity or system responsiveness; The interleaving problem; Centralized I/O management; Concurrent processes; varying priorities; Scheduling with pre-emption and time-slicing.

Commercial Executive Systems: Functionality; selection criteria; Scheduling strategies; Using a target executive, such as FreeRTOS; Processes; events; signals; pipes; Networking support facilities.

Choice of languages for Real-time Systems implementations: The requirements for real-time systems; Choosing a compiler.

Using a data-flow method for design, eg Ward-Mellor/Yourdon: Diagrams; pseudocode text; hierarchical design capture; Transformation to code modules; Run-time support facilities; Process communication/synchronization methods.

Review of Design Methodologies for Real-time Systems: Yourdon; Object Oriented Methods; DARTS.

Planning for multiple platform cross development; choosing and configuring cross-compiler tool kits.

Choosing and using microcontroller target board.

Teaching and Learning Methods: An outline case-study specification will be provided, such as: POS retail network, a distributed Conference support system, or a Secure Access Control System. Such schemes give broad scope for a range of interests to suit final year students returning with diverse experience and skills from their Placement Year.

Students will work in small groups to progressively carry out the series of steps for initial prototype development. They will be required to hold regular group meetings for specification analysis, work allocation, design reviews and general planning activity.

The students will be expected to progress the initial outline specification, through more detailed functional specifications and onto a prototype implementation with a final demonstration, seeking help from professional experts as appropriate, e.g. through online forums.

The group work will be regularly monitored by a tutor who will answer questions in the role of Client, but also assess the competence and contribution of individual members of each group.

Scheduled learning includes lectures, tutorials, practical work and supervised time in the lab.

Independent learning includes hours engaged with essential reading, development time and group working outside of scheduled classes, assignment preparation and completion etc. These sessions constitute an average time per level as indicated in the table above Scheduled sessions may vary slightly depending on the module
choices you make.

Contact Hours:

Activity:
Contact time: 72 hours
Assimilation and development of knowledge: 148 hours
Exam preparation: 20 hours
Coursework preparation: 60 hours
Total study time: 300 hours

Part 3: Assessment
The assessment will demonstrate the learning outcomes by taking an implementation approach which allows the students, through the course of the module, to build on their learning and demonstrate it through the development of a software artefact. The students are encouraged to document the development process as they go and this too contributes to the final module assessment. The individual's contribution to that group is assessed through an individual statement, verified by other group members' reports. The process is assessed via a record of group review meetings and a final group presentation. The product itself is assessed through a demonstration. Plagiarism is 'designed out' both because the students have to present their work and also because of the bespoke nature of the artefacts produced.

Consistent with the largely practical approach of this module, a relatively lowly weighted exam (25% of the module) assesses the more theoretical element.			
First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		25 %	Individual contribution to project report & implementation (1500 words)
Presentation - Component B		25 %	Group demonstration
Presentation - Component B		25 %	Group review meetings and final (20 min) presentation
Examination (Online) - Component A	✓	25 %	Online Examination (3 hours) 24 hour window
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		75 %	Final report, documenting the individual contribution, evidence of the process undertaken, evidence of outputs produced. (approx 2000 words plus programme code as appropriate)
Examination (Online) - Component A	✓	25 %	Online Exam 3 hours 24 hour window

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	**Reference**
Choose and use appropriate software design methods for concurrent and control systems development	MO1
Design and develop a computer system for an embedded application	MO2
Recognise and deal with the inherent complexity of an embedded system	MO3
Evaluate the competing demands of the various technical, pragmatic, environmental and commercial pressures that impact software development decisions and appropriately reconcile these demands using recognised methods	MO4
Select an appropriate systematic approach to the development of a quality product	MO5
Work with colleagues and others, including sector experts and reflect on the successes failures therein	MO6

Contact Hours

Independent Study Hours:

Independent study/self-guided study	228
Total Independent Study Hours:	228

	Scheduled Learning and Teaching Hours:	
	Face-to-face learning	72
	Total Scheduled Learning and Teaching Hours:	72
	Hours to be allocated	300
	Allocated Hours	300
Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ufcf6y-30-3.html	

Part 5: Contributes Towards
This module contributes towards the following programmes of study: Electronic and Computer Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2018-19 Electronic and Computer Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2018-19 Electronic and Computer Engineering [Sep][PT][GlosColl][5yrs] BEng (Hons) 2018-19 Electronic and Computer Engineering {Apprenticeship} [Sep][PT][GlosColl][5yrs] BEng (Hons) 2018-19