

Northumbria University Programme Framework for Northumbria Awards - Module Specification

Faculty	Engineering and Environment	Department	CIS	Subject		Module Tutor	Alun Moon			
Module Title	Computer Networks and Control Systems					Module Code	KF5011			
Module Type* <small>(see key below)</small>	STAN									
Module size credits	Level 3:		Level 4:		Level 5:	20	Level 6:		Level 7:	
Home programme/s for which the module is designed				MComp / BSc (Hons) Computer Science MComp / BSc (Hons) Computer Science with Animation, Graphics and Vision MComp / BSc (Hons) Computer Science with Artificial Intelligence MComp / BSc (Hons) Computer Science with Games Development MComp / BSc (Hons) Computer Science with Web Development			Code/s	21SIMU-N, IMU1 / 21SSOE-N, CSC1 21SCSA-N, CSC3AGV CSC3ARI CSC3GAD CSC3WED		
Additional Programme/s other than that/those for which the module for specifically designed				None			Code/s			
Delivery Pattern (Please tick)		Semester based <i>(please specify)</i>	Sem 1 <input type="checkbox"/> Sem 2 <input checked="" type="checkbox"/>		Year Long		<input type="checkbox"/>	Full-time		<input checked="" type="checkbox"/>
								Part-time		<input type="checkbox"/>
								Distance Learning		<input type="checkbox"/>
Location(s) of delivery: If delivered at EPWO partners please give partner name and location										

***KEY:**

APL Accreditation for prior learning
 CORE PNVQ core skills module
 DISS Dissertation
 FLDW Fieldwork
 INDS Independent study
 MAFOUN MA foundation modules - ASS

P/F Pass/fail module
 P/F_DS Pass/fail dissertation module
 P/F_PJ Pass/fail project module
 P/F_PL Pass/fail placement module
 PLAY Placement – academic study abroad FT
 PLCL Placement – Clinical

PLIN Placement - Industrial
 PRAC Practical
 PROJ Project
 STAN Standard module
 WKBS Work base study
 WORK Workshop

Module Overview (Max 250 words per section) (This section is aimed at providing a prospective or current student with a brief overview of the module in answer to the specific questions and will form an element of the module handbook)

What will I learn on this module? (SRS 0001) Please give a brief indication of the content of the module including the main topic / subject areas studied	
<p>On this module you will learn about computer networks and networked embedded control systems. Many systems now use a network of small computers and devices, from modern cars to the Internet of Things. This module looks at the interaction between devices (sensors and actuators) and the controlling computer. The various networking and communications technologies that connect these systems together, their infrastructure and protocols, will be discussed while considering cybersecurity architecture and operations as appropriate.</p> <p>You will learn how to control hardware attached to computers. This involves understanding the basics of the electronic circuits used in attaching the hardware, the features of the processors that interact with hardware and the writing of device drivers (the code that controls the devices). You will learn about microprocessor organisation with respect to Input / Output (I/O) and software development for networked control systems using an appropriate language.</p>	
How will I learn on this module? (SRS 0002) Please provide a brief overview the learning and teaching approaches the student can expect to experience.	
<p>Lectures will cover theory underpinning the subject that you then put into practice in practical workshop sessions using dedicated hardware. In the practical sessions you will put the subject into practice writing code for real systems. There will also be practical surgery sessions where you can seek additional advice and support. In addition, there is a range of recommended independent reading and practical exercises to provide you with further hands on practice with the hardware.</p>	
How will I be supported academically on this module? (SRS 0003) Please provide a brief overview of the academic support available to students, including any support that may be accessed outside formal scheduled teaching.	
<p>The practical sessions will have members of staff present to guide you through the art and practice of writing programs for these systems, including providing feedback on your work. You can also contact staff via email outside the scheduled sessions. In addition, there is also a wide range of guides and reference material that is made available through the module eLP (electronic learning portal) blackboard site.</p>	
What will I be expected to read on this module? (SRS 0004) All modules at Northumbria include a range of reading materials that students are expected to engage with. The reading list for this module can be found at: http://readinglists.northumbria.ac.uk (Reading List service online guide for academic staff this contains contact details for the Reading List team – http://library.northumbria.ac.uk/readinglists)	
Northumbria University Library Reading List Service (please confirm the following)	Please give date added
A draft reading list has been created and on the university Library Reading List Service (required for approval)	Click here to enter a date.
Reading material has been acquired and digitised (following approval)	Click here to enter a date.
Reading list has been published to students (for module delivery)	Click here to enter a date.

Module Learning Outcomes (MLOs) (Max of five in total)

<p><u>What will I be expected to achieve?</u> (SRS 0005)</p> <p>Knowledge & Understanding:</p> <ol style="list-style-type: none"> 1. Demonstrate knowledge and critical understanding of the interaction between physical systems, computer hardware and software, including control theories, network protocols, and cybersecurity architecture and operations 2. Apply principles of design and implementation of stack models, network protocols, control systems, and security <p>Intellectual / Professional skills & abilities:</p> <ol style="list-style-type: none"> 3. Design, implement, test, document and evaluate a networked embedded control system 4. Apply software development tools and best practice to produce, test and debug software for small networked control systems using specifications for embedded devices and associated hardware <p>Personal Values Attributes (Global / Cultural awareness, Ethics, Curiosity) (PVA):</p> <ol style="list-style-type: none"> 5. Demonstrate independent, critical and reflective thinking and practice in the development of a networked control system, and engagement with 	<p><u>How will I be assessed?</u> (SRS 0006) <i>Please give details of all formative and summative assessment process indicating which MLOs will be addressed and how feedback will be provided.</i></p> <p>Formative assessment and feedback Formative assessment will take the form of exercises in the practical classes to help you apply theory and to check your understanding. Your tutors will comment on your progress and make suggestions for improvement.</p> <p>Summative assessment Summative assessment is by a portfolio assignment covering the development of a complex networked control system, including elements such as; input, output, feedback loops, networking, data logging, and security. It will assess all of the module's MLOs.</p> <p>Students will be given written and oral feedback which they can feed forward into other modules.</p>	<p><u>Programme (Level) Learning Outcomes that this module contributes to:</u> <i>[Please insert PLO number as listed on the programme specification]</i></p> <p>Knowledge & Understanding:</p> <ul style="list-style-type: none"> • KU1, KU2, KU3, KU5 <p>Intellectual / Professional skills & abilities:</p> <ul style="list-style-type: none"> • IPSA1, IPSA3, IPSA4, IPSA6 <p>Personal Values Attributes (Global / Cultural awareness, Ethics, Curiosity) (PVA):</p> <ul style="list-style-type: none"> • PVA1, PVA2, PVA4
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appropriate professional and technical literature to support and communicate such development		
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Pre-requisite(s) (SRS 0007) Any module which must already have been taken, or any stipulated level of prior knowledge required in order to study this module, (co-requisite core models need not be listed)	None
Co-requisite(s) (SRS 0008) Modules at this level which must be taken with this module	None

Module abstract (SRS 0009)

Please provide a brief a brief abstract of the module (150 words max). This section acts as the ‘shop window’ for the module, therefore it needs to engage and inspire the student. This is the first thing that the student will read about this module, so it must immediately grab their attention. The main aim is to encourage the student to read on, however the summary should be written in such a way that if the student reads nothing else this section will convey all key messages and benefits that the module will offer. Start by explaining the module title where necessary. Then highlight any selling points relating to the four pillars: Research-Rich Learning; Technology Enhanced Learning; Assessment and Feedback; Employability and Entrepreneurship. Examples may include student satisfaction rates, learning environment, state-of-the-art facilities etc. Finally indicate benefits of the module such as the key skills that the students will gain for future employment and career paths that are open to them.

On this module you will learn about computer networks and networked embedded control systems. Many systems now use a network of small computers and devices, from modern cars to the Internet of Things. This module looks at the various networking and communications technologies that connect these systems together and how they interact with the computers, and the appropriate security technologies. You will learn how to control hardware attached to computers.

Programme Framework for Northumbria Awards Research Rich Learning Design Pillar (SRS 0090)

Embedding Research Rich Learning into the curriculum: Indicate how students will be actively engaged in research rich learning in this module through: research/enquiry based learning, research tutored learning, research led learning and/or research oriented learning, providing a brief overview of how this / these will feature within the delivery of the module (250 words max)

Note:

- **Research/enquiry Based:** L&T Based on student-centred enquiry and research activities (conducting research).
- **Research Tutored:** L&T Emphasises learning focused on students actively discussing research, and critically engaging with research outputs
- **Research Led:** T&L structured around subject content and that content is based on the research (learning about research)
- **Research Orientated:** T&L Emphasises understanding of the knowledge production process, and methods of enquiry in the subject (learning how to research)

The subject content of the module will be based upon up-to-date computer network and control system technologies, using a research led approach.

Notional Student Workload (NSW) for each mode of delivery

Complete for each delivery mode where the distribution of NSW Full Time Mode of Delivery				Part Time Mode of Delivery			
Activity type	Hours	KIS category	KIS category hours		Hours	KIS category	KIS category hours
Lecture	24	Scheduled	72	Lecture		Scheduled	
Seminar				Seminar			
Tutorial				Tutorial			
Project Supervision				Project Supervision			
Demonstration				Demonstration			
Practical classes and workshops	48			Practical classes and workshops			
Supervised time in studio/ workshop				Supervised time in studio/ workshop			
Fieldwork				Fieldwork			
External visits				External visits			
Tutor guided independent learning	12	Independent	128	Tutor guided independent learning		Independent	
Student independent learning	116			Student independent learning			
Placement		Placement	0	Placement		Placement	
Study abroad				Study abroad			
Work based learning				Work based learning			
Total workload <i>200 hours for 20 credit module</i>	200		200	Total workload			

Summative Assessment

Sequence 001, 002 etc.	Activity type indicate ONE of the following types:	Brief description of assessment (max.120 characters) e.g. type/ length of exam, type/ word limit of coursework	Weighting % or Pass/Fail (for grade only components) Note: % weightings should add up to 100% for module overall	Final assessment		Anonymous submission		ESAF submission	
				Yes	No	Yes	No	Yes	No
001	CW (Coursework)	Portfolio covering the development of a complex networked control system, including elements such as; input, output, feedback loops, networking, data logging, and security	100%	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
002				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
003	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
004	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
005	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
006	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
007	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
008	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
009	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
010	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
011	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
012	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Reassessment (specify either synoptic or non-synoptic)

Synoptic reassessment One form of reassessment that tests all module learning outcomes	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Non-synoptic reassessment Where module referred overall, individual failed components of assessment are reassessed	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

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Date of FPARSC Approval

[Click here to enter a date.](#)

Date of entry onto SITS	Click here to enter a date.		
<u>LOG OF CHANGES POST-APPROVAL</u>			
Please indicate any changes to the approved module descriptor from 2012/13 onwards			
Section No.	Brief description of change	Date of Approval	Semester and year of first implementation
		Click here to enter a date.	
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