

Title:	Electronic Systems Programming	APPROVED
Long Title:	Electronic Systems Programming	
Module Code:	INTR6017	
Credits:	5	
NFQ Level:	Fundamental	
Field of Study:	Interdisciplinary Engineering	
Valid From:	Semester 1 - 2017/18 (September 2017)	
Module Delivered in	5 programme(s)	
Module Coordinator:	JOSEPH CONNELL	
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Module Description:	This module introduces high level language programming with a particular emphasis on the design of code for electronic engineering systems. Students will develop the fundamental skills required to produce software solutions for engineering projects involving the manipulation of hardware and communication with external systems.	
Learning Outcomes		
On successful completion of this module the learner will be able to:		
LO1	Develop structured programs to solve given tasks using the full range of statements in a high level programming language.	
LO2	Use debugging techniques, simulators and emulators to test and debug software solutions.	
LO3	Use serial communication to interface with external electronic modules.	
LO4	Produce documented and ethical code using accepted best practice in the electronics industry.	
Pre-requisite learning		
Module Recommendations		
<i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i>		
Interface Programming module		
Incompatible Modules		
<i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.</i>		
No incompatible modules listed		
Co-requisite Modules		
No Co-requisite modules listed		
Requirements		
<i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.</i>		
No requirements listed		
Co-requisites		
No Co Requisites listed		

Module Content & Assessment

Indicative Content

Introduction to C

Origins of C, why C is relevant to the field of electronic engineering, typical program structure, introduction to a typical C development system, compiling, debugging etc. Data types in C, storage classes, input and output functions, operators; arithmetic, relational and bitwise, type casting, 'size of' operator

C Language

if, for, while, do while, break, continue, switch. Functions, macros, scope of variables, variable classes, arrays and strings. Arrays, pointers, structures, unions, dynamic memory allocation. Using files in C

Serial communication

Interfacing with external electronic devices and modules using serial communication.

Code documentation

Documenting code, algorithms and flow charts.

Ethical issues in software development

Standards expected of an engineer developing software including copyright, licensing and ethical issues such as reverse engineering and failing to address known bugs. Industry best practice.

Assessment Breakdown

	%
Course Work	100.00%

Course Work

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	Assignment to implement a simple software solution including appropriate documentation of code.	1,2	20.0	Week 7
Project	Design the software to implement a solution to a given problem including documentation using accepted best practice.	1,2,3,4	30.0	Sem End
Practical/Skills Evaluation	Practical programming in lab	1,2,3,4	50.0	Every Week

No End of Module Formal Examination

Reassessment Requirement

Coursework Only

This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.

The institute reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time

<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lab	1 x 3 hour laboratory	3.0	Every Week	3.00
Independent & Directed Learning (Non-contact)	Self study	4.0	Every Week	4.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				3.00

Workload: Part Time

<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lab	1 x 3 hour lab	3.0	Every Week	3.00
Independent & Directed Learning (Non-contact)	Self study	4.0	Every Week	4.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				3.00

Module Resources
<i>Recommended Book Resources</i>
<ul style="list-style-type: none"> • Dept. Of Electrical & Electronic Engineering, <i>CIT Department of Electrical & Electronic Engineering Electronic Systems Programming Notes</i>, CIT
<i>Supplementary Book Resources</i>
<ul style="list-style-type: none"> • Mike McGrath 2012, <i>C Programming In Easy Steps 4th Edition</i>, 4 Ed., In Easy Steps [ISBN: 1840785446, ISBN-13: 978-1840785449] • Greg Perry, Dean Miller 2013, <i>C Programming Absolute Beginner's Guide</i>, 3 Ed., QUE [ISBN: 0789751984, ISBN-13: 978-0789751980] • Brian W. Kernighan, Dennis M. Ritchie 1988, <i>The C programming language</i>, Prentice Hall Englewood Cliffs, N.J. [ISBN: 0-131-10362-8] • K N King 2008, <i>C Programming: A Modern Approach</i>, 2 Ed., W. W. Norton & Co. [ISBN: 0393979504, ISBN-13: 978-0393979503] • Jaeschke, R 2000, <i>C: The Complete Reference</i>, Osborne McGraw-Hill [ISBN: 0072121246] • Kochan, Stephen 2004, <i>Programming in C</i>, Sams [ISBN: 0672326663, ISBN-13: 978-0672326660]
<i>This module does not have any article/paper resources</i>
<i>Other Resources</i>
<ul style="list-style-type: none"> • Website: <i>C Programming Tutorial</i> http://www.cprogramming.com/tutorial/c-tutorial.html • Website: <i>How Stuff Works Explanation of C</i> http://www.howstuffworks.com/c.htm • Website: <i>ANSI C links</i> http://www.lysator.liu.se/c/index.html • Website: <i>Microsoft Developers Network</i> http://www.msdn.com

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_EEPSY_8	<u>Bachelor of Engineering (Honours) in Electrical Engineering</u>	3	Elective
CR_EELES_8	<u>Bachelor of Engineering (Honours) in Electronic Engineering</u>	3	Mandatory
CR_EELEC_7	<u>Bachelor of Engineering in Electrical Engineering</u>	3	Elective
CR_EELXE_7	<u>Bachelor of Engineering in Electronic Engineering</u>	3	Mandatory
CR_EELXE_6	<u>Higher Certificate in Engineering in Electronic Engineering</u>	3	Mandatory