



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

INTR6002: Embedded Programming

Module Details

Short Title:	Embedded Programming	APPROVED
Full Title:	Embedded Programming	
Module Id:	2764	
Official Code:	INTR6002	NFQ Level: 6
		ECTS Credits: 5

Coordinator:	JOSEPH CONNELL
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Description:	This module introduces programming with a particular emphasis on designing code for microcontrollers and embedded systems. A high-level language is used to introduce the essential elements of programming, and, throughout the module, robots and microcontrollers are used to demonstrate embedded systems programming in a practical manner.
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Learning Outcomes:

On successful completion of this module the learner will be able to...

1. Describe common high-level language commands.
2. Show how to use conditional branching and program loops.
3. Demonstrate how to use modular programming.
4. Design software solutions for embedded systems.
5. Understand the practicalities of digital interfacing between the embedded system and the outside world.

Pre-requisite learning

Module Recommendations

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).

No recommendations listed

Incompatible Modules

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.

No incompatible modules listed

Module Requirements

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.

No requirements listed



Module Content & Assessment

Indicative Content

- **Introduction to data types**
Numeric data types, variables, constants, literals.
- **Introduction to embedded systems**
Overview of embedded systems, microcontrollers, embedded systems interfacing, current sourcing and sinking, voltage thresholds.
- **Control Structures**
IF ...THEN, IF... THEN... ELSE, IF...THEN...ELSEIF, SELECT CASE, logical operators.
- **Loops**
Count controlled loops, event controlled loops.
- **Modular Programming**
Writing functions and sub-programs, parameter passing, local variables.
- **Strings**
String data type, ASCII character codes, functions for dealing with strings.
- **Embedded systems examples**
Robot movement control, switch debouncing, motor speed control, temperature control.

Assessment Breakdown	%
Course Work	100%
End of Semester Formal Examination	0%

Coursework Breakdown				
Type	Description	Outcome addressed	% of total	Assessment Date
Multiple Choice Questions	Examining language commands, conditional branching/loops, digital interfacing.		20	Week 4
Practical/Skills Evaluation	Using a practical exam in the lab.		25	Week 7
Project	Involving the completion of an assignment.		20	Week 11
Practical/Skills Evaluation	Involving continuous assessment of performance in the lab.	1,2,3,4	35	Every Week

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



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Module Workload & Resources

Workload		Full-time mode		
Type	Description	Hours	Frequency	Average Weekly Learner Workload
Lab	2 x 2 hour lab per week	4	Every Week	4.00
Independent & Directed Learning (Non-contact)	3 hours of student autonomous learning	3	Every Week	3.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

Workload		Part-time mode		
Type	Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	1 x 1 hour lecture	1	Every Week	1.00
Lab	1 x 2 hour lab	2	Every Week	2.00
Independent & Directed Learning (Non-contact)	4 hours of independent learning	4	Every Week	4.00
Total Weekly Learner Workload				7.00

Resources

Recommended Book Resources

- **CIT 2007, CIT Department of Electronic Engineering Embedded Programming Notes**

Supplementary Book Resources

- **Waite, Mitchell 1990, *Microsoft QuickBasic Bible*, Microsoft Press, U.S. [ISBN: ISBN-10: 1556152620 ISBN-13: 978-1556152627]**
- **Craven, Kenneth A 1998, *Programming in QBASIC for Engineering Technology*, Prentice Hall [ISBN: ISBN-10: 0136227481 ISBN-13: 978-0136227489]**
- **Hellebuyck, Chuck 2004, *Programming PIC Microcontrollers with PICBASIC (Embedded Technology)*, Newnes [ISBN: ISBN-10: 1589950011 ISBN-13: 978-1589950016]**
- **Iovine John 2004, *PIC Microcontroller Project Book: For PIC Basic and PIC Basic Pro Compilers (Tab Robotics)*, 2 Ed., McGraw-Hill Education [ISBN: ISBN-10: 0071437045 ISBN-13: 978-0071437042]**

Other Resources

- **Website: FreeBasic**
<http://www.freebasic.net/>
- **Website: Qbasic programming**
<http://www.tedfelix.com/qbasic/>
- **Website: JustBasic**
<http://www.justbasic.com>
- **Website: Microchip Microcontrollers**
<http://www.microchip.com>