Title:	Intro to Prog for Measurement APPROVED
Long Title:	Intro to Prog for Measurement

Module Code:	PHYS6024	**Duration:**	1 Semester

Credits:	5
NFQ Level:	Fundamental
Field of Study:	Physics
Valid From:	Semester 1 - 2022/23 (September 2022)
Module Delivered in	3 programme(s)
Module Coordinator:	Donagh OMahony
Module Author:	AnneMarie McCarthy
Module Description:	This module introduces the Python programming language, and its use in the control of scientific instruments, and collection and analysis of data. Some common features of Python are introduced, as well as code development strategies and techniques, in order to develop interfaces and scripts appropriate for measurement, control and data analysis applications.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain and implement data-types and operators.
LO2	Describe and implement common program control structures and subprograms.
LO3	Demonstrate the use of debugging tools in the development of applications.
LO4	Demonstrate the use of software libraries in the development of applications.
LO5	Develop programs for measurement, control and data analysis applications.

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 MTU module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).

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

Co-requisite Modules

No Co-requisite modules listed

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 Introduction to the Python programming language, scripts, shells, interpreters, code editors and IDEs.
Fundamental Programming Concepts Concept of variables and variable types, constants, arithmetic & logical operators, keyboard/screen I/O, strings, lists, control structures, functions, modules.
Application Development Code development strategies, syntax & run-time errors, de-bugging, use of software libraries, version control e.g. git and github.
Applications to Measurement, Control and Data Analysis Data acquisition from sensors/systems. Data processing and analysis using common software libraries e.g. numpy, pandas

Assessment Breakdown	%
Course Work	100.00%

Course Work

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Laboratory Assignments	1,2,3,4,5	20.0	Every Second Week
Practical/Skills Evaluation	Open-book laboratory assessment	1,2	25.0	Week 6
Short Answer Questions	Written theory assessment	1,2,3,4	15.0	Week 8
Practical/Skills Evaluation	Open-book laboratory assessment	1,2,3,4,5	40.0	Week 13

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				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Delivery of module content	2.0	Every Week	2.00
Lab	Delivery & application of module content	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Study & homework	3.0	Every Week	3.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	4.00

Workload: Part Time				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Delivery of module content	2.0	Every Week	2.00
Lab	Delivery & application of module content	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Study & homework	3.0	Every Week	3.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	4.00

Module Resources

Recommended Book Resources

- **Eric Matthes 2019, *Python Crash Course*, 2nd Ed., No Starch Press [ISBN: 1593279280]**

Supplementary Book Resources

- **Simon Monk, *Programming the Raspberry Pi: Getting Started with Python*, 3rd Ed., McGraw Hill [ISBN: 126425735X]**

This module does not have any article/paper resources

Other Resources

- **Website: *Python Tutorials***
  http://www.learnpython.org

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_SINEN_8	Bachelor of Science (Honours) in Instrument Engineering	3	Mandatory
CR_SPHYS_7	Bachelor of Science in Applied Physics and Instrumentation	3	Mandatory
CR_SPHYS_6	Higher Certificate in Science in Applied Physics and Instrumentation	3	Mandatory