



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

INTR6003: Robotics 1

Module Details

Short Title:	Robotics 1	APPROVED
Full Title:	Robotics 1	
Module Id:	2879	
Official Code:	INTR6003	NFQ Level: 6
		ECTS Credits: 5

Coordinator:	JOSEPH CONNELL
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Description:	The objective of this module is to introduce the student to the fundamental concepts of robotics. This course exposes the student to a number of diverse engineering disciplines. The topics covered include computer control, electronic sensors, and the principles of robotic locomotion. The theoretical basis will provide the student with the knowledge to create a robot capable of performing simple tasks.
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Learning Outcomes:

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

1. Identify and demonstrate how input, output, and processing occur in an embedded computer system.
2. Implement basic mechanical actuation configurations.
3. Demonstrate the use of basic drive train configurations for locomotion.
4. Explain the operating principles of the most common sensors used in robotics.

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

- **Physical Concepts**
Force, torque, inertia, velocity, acceleration.
- **Mechanical Actuation Configurations**
Gears, cams, belts and drives, kinematic chains.
- **Mechanical Systems**
Drive train configurations-for example: wheeled, track-based, walking, etc. Robot arm, and manipulator geometries.
- **Electrical Concepts**
Current voltage, resistance, inductance, capacitance, Ohm's law.
- **Electronic Concepts**
P-N junction, diode, transistor as a switch, basic motor driving circuits analogue to digital conversion
- **Sensors**
Potentiometers, potential dividers, light dependant resistor (LDR), photodiode, shaft encoder, ultrasonic range finder, Infra red distance measurement, microphone
- **Computer Programming**
Introduction to program flow, variables, conditional statements, control structures, data collection, multi-tasking
- **Algorithm Development**
Reactive and basic feedback control strategies

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

Coursework Breakdown				
Type	Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Computer programming exercises	1	15	Week 3
Practical/Skills Evaluation	Mechanical actuator exercises	1,2	15	Week 5
Practical/Skills Evaluation	Drive train configuration exercises	1,2,3	15	Week 7
Practical/Skills Evaluation	Sensors exercises	1,4	15	Week 9
Project	Group project - Design and implement a solution for a specified task	1,1,2,3,4	40	Week 12

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



Module Workload & Resources

Workload		Full-time mode		
Type	Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Class Lecture	2	Every Week	2.00
Lab	Laboratory exercises / project work	2	Every Week	2.00
Independent & Directed Learning (Non-contact)	Material Review	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	Class lecture	3	Every Second Week	1.50
Lab	Laboratory exercises / project work	3	Every Second Week	1.50
Independent & Directed Learning (Non-contact)	Material Review	3	Every Week	3.00
Independent & Directed Learning (Non-contact)	Exercises	1	Every Week	1.00
Total Weekly Learner Workload				7.00

Resources

Recommended Book Resources

- McComb, Gordon. 2000, *The robot builder's bonanza*, 2nd Ed., McGraw-Hill New York ; London [ISBN: 0071362967]
- Cook, David 2004, *Intermediate Robotic Building*, Springer-Verlag New York [ISBN: 1590593731]