Module Title:	Autonomous Robotics
Language of Instruction:	English

Credits:	5

NFQ Level:	8

Module Delivered In	1 programme(s)

Teaching & Learning Strategies:	This module will be delivered through a mix of lectures, laboratory assignments and projects including a professional write up. It will employ a mixture of active/task-based learning, reflective learning and problem-based learning.

Module Aim:	The aim of this module is to develop an in-depth understanding and insight to enable selection and development of suitable algorithms and techniques for problem statement, solution-based robot design, safely and ethically as used in automated processes across a range of industrial applications.

Learning Outcomes
On successful completion of this module the learner should be able to:

LO1	Design and implement motion control for robotics.
LO2	Design, plan and implement robotic navigation systems.
LO3	Design and implement localization systems.
LO4	Apply probabilistic estimation techniques to mapping.

Pre-requisite learning
Module Recommendations
This is prior learning (or a practical skill) that is recommended before enrolment in this module.
No recommendations listed
Incompatible Modules
These are modules which have learning outcomes that are too similar to the learning outcomes of this module.
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.
No requirements listed

Module Content & Assessment

Indicative Content
Motion Control Definition of a robot. Motion and control of a robot: move, follow, avoid.
Navigation Sensors: position, velocity, distance, vision. Reactive: Braitenberg vehicles. The distance transform.
Localisation Dead reckoning and map-based localization.
Mapping Introduction to probabilistic estimation: Pose estimation. Localization and Mapping

Assessment Breakdown	%
Project	20.00%
Practical	20.00%
End of Module Formal Examination	60.00%

No Continuous Assessment

Project				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	A group/solo (depending on complexity) project based on real-world scenarios.	4	20.00	n/a

Practical				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	A set of practical exercises to complement the theory elements of the module.	1,2,3,4	20.00	n/a

End of Module Formal Examination				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	A final exam to assess the students' learning.	1,2,3	60.00	End-of-Semester

No Continuous Assessment

Project				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	A group/solo (depending on complexity) project based on real-world scenarios.	4	20.00	n/a

Practical				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	A set of practical exercises to complement the theory elements of the module.	1,2,3,4	20.00	n/a

End of Module Formal Examination				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	n/a	1,2,3	60.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	Every Week	1.00
Laboratory	Every Week	4.00
Independent Learning Time	Every Week	4.00
	Total Hours	9.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EEROB_B	Bachelor of Engineering (Honours) in Robotics and Automated Systems	7	Mandatory