SYST C4604: Autonomous Robotics

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

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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

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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