

Module Title:	Robot Mechanics
Language of Instruction:	English
Credits:	5
NFQ Level:	8
Module Delivered In	1 programme(s)
Module Aim:	To introduce students to the issues involved in the mechanical design and modelling of robotic manipulators.
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Distinguish the variety of common mechanical components and joint types used in robotic systems
LO2	Analyze the principles of object location
LO3	Calculate end effector position for typical robot arm configurations
LO4	Calculate manipulator kinematics, position, velocity and acceleration
LO5	Relate theory to practical end effector location and positioning
Pre-requisite learning	
Module Recommendations <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
No requirements listed	

Module Content & Assessment

Indicative Content

Common components

Wrists, End Effectors, Joint types; Prismatic waist, revolut shoulder etc. Link types, robot classifications (play back, vision controlled etc.)

Object location in 3-D Cartesian space

Cartesian coordinates, two and three dimensional transformations using matrices, Relative and general transformations, Inverse transformation

Forward and inverse kinematic modelling of multi-link manipulators

Assignment of coordinate frames, Homogenous transformations, Direct kinematic solutions, General orientation transform, Inverse kinematics, redundancies and degeneracies

Dynamic solution of robot manipulators

Velocity and acceleration of rigid bodies, Differential Motion, The manipulator Jacobian, Singularities

Assessment Breakdown

	%
Continuous Assessment	20.00%
Practical	10.00%
End of Module Formal Examination	70.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	Various assessments to reinforce learnings given throughout the semester.	1,2,3,4,5	20.00	n/a

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Aset of regular practical exercises to complement the theory elementsof the module.	5	10.00	n/a

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Formal end of semester examination	1,2,3,4	70.00	End-of-Semester

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

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	4.00
Laboratory	Every Week	1.00
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	8	Mandatory