PROJ C4606: Robot Mechanics

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

PROJ C4606: Robot Mechanics

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

PROJ C4606: Robot Mechanics

Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
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