Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Unit Title: INTELLIGENT MECHANISMS DESIGN

Unit ID: ENGIN3406

Credit Points: 15.00

Prerequisite(s): (ENGIN2303 or ENMEC2111)

Co-requisite(s): Nil

Exclusion(s): (ENMTX4010)

ASCED: 039999

Description of the Unit:

This unit introduces students to basic principles of Intelligent Mechanisms and kinematics and dynamics. This unit will introduce design of specific advanced intelligent mechanisms with forward and inverse kinematics. Further, dynamics of mechanisms and control of mechanisms with PID, Joint space, operational space and force control.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory						

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Intermediate						
Advanced			✔			

Learning Outcomes:

On successful completion of the unit the students are expected to be able to:

Knowledge:

K1. Explain common terminologies and conventions in intelligent mechanisms.

K2. Synthesise the important concepts in kinematics and dynamics of robot manipulators.

K3. Translate the basic theories and mathematics behind intelligent mechanism design into engineering practice.

K4. Develop mathematical models of the kinematics and dynamics of the industrial manipulators.

Skills:

S1. Design mechanisms using forward and inverse kinematics.

S2. Develop mathematical models of mechanisms.

S3. Analyse the dynamics of mechanisms.

S4. Apply the mathematical principles for the control of mechanisms.

S5. Use mathematical tools for the design and control of mechanisms.

Application of knowledge and skills:

A1. Integrate knowledge relating to the design and development of intelligent mechanisms.

A2. Apply of theories to analyse the dynamics of mechanisms.

A3. Use theories for the intelligent control of mechanisms.

Unit Content:

Topics may include:

- Introduction to intelligent mechanisms
- Spatial Descriptions
- Forward Kinematics
- Jocobians (velocity, explicit form, static forces)
- Inverse kinematics
- Dynamics (acceleration, explicit form)

- Control (PID, joint space, operational space, force control)

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1-K4, S1-S5, A1-A3	Understanding of principles and mathematics involved	Laboratory and tutorials	10 - 30%
K1-K4, S1-S5, A1-A3	To verify the gradual understanding of concepts	Assignments	20 - 40%
K1-K4, S1-S5, A1-A3	Any combination of questions and problems from the whole of the unit content.	Exams / Tests	40 - 60%

Adopted Reference Style:

Other (IEEE: Refer to the library website for more information)

Refer to the library website for more information

Fed Cite - referencing tool