MECH H2603: Mechatronics 2

Module Title:	Mechatronics 2
Language of Instruction:	English

Credits:	10

NFQ Level:	6

Module Delivered In	No Programmes

Teaching & Learning Strategies:	Module will be delivered through lectures, tutorials, and practical sessions.

Module Aim:	The aim of this module is to provide the students with the knowledge to design, build and analyse compressed air, hydraulic and electromechanical systems typically used in industry.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Design a Compressed air system for a factory
LO2	Examine and analyse Hydraulic systems
LO3	Design and build Electro-pneumatic/hydraulic circuits.
LO4	Describe the operation of AC Motors understanding their specific starting characteristics, efficiencies, speed control and testing.
LO5	Describe Safe System of Work Plan (S.S.W.P.) for Lock-out Tag-Out in industrial applications.

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
Design Compressed Air System Calculate Air requirements Design ring and branch mains Layout plant room and considerations for maintenance, expansion and operation. Calculate pressure drops around the mains Drawings of plant room, ring main and typical details. Safety - risk assessment on start-up of compressed air plant and equipment.
Hydraulics Pump selection and calculation of pressure and flow Construction and analysis of hydraulic circuits for particular applications. Filtration and design of Offline filtration loops, with filter sizing and efficiency. Design of hydraulic power packs, including tank, frame, pump position, valve sub plate mounting, heating and cooling circuits.
Cascade Pneumatics / Electro Pneumatics / Hydraulics. Indirect control of basic electro-pneumatic circuits Correct use of contactors/relay timers and proximity switches. Terminal labelling, standard notation. Design and representation of electrical control circuits for the control of basic electro pneumatic/hydraulic systems. Application of cascade circuits in packaging / handling equipment and analysis of typical pick and place control circuits used in industry. Recognising base positioning and start up conditions, emergency stop implications. Application of solenoid valves and proportional control valves, trouble shooting on circuits and logical steps in analysing problems on electro pneumatic/hydraulic circuits.
AC Motors Induction Motors and their operation Torque-load curves and starting characteristics. Methods of starting DOL, Star/Delta, Soft Starters, VSD Calculation of motor size and consideration of energy use over its lifetime in selection of motor types, Eff1, Eff2...
Variable Speed Drives VSDs basic design and function Application of VSD on variable torque loads and potential energy saving of using VSDs on fans, pumps and payback.
Safety & Isolation Procedures Plant Isolation and safety protocols Lock-Out Tag-Out Risk assessment in maintenance and importance of procedures in isolation

Assessment Breakdown	%
Continuous Assessment	10.00%
Project	20.00%
Practical	10.00%
End of Module Formal Examination	60.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Other	Written class tests and or online assessment may be employed to encourage individual learning	2,3,4,5	10.00	n/a

Project

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Project	Students are expected to prepare a comprehensive project on a compressed air system for a factory which should include all calculation, drawing, specification and selection of compressor	1,3,4	20.00	Sem 1 End

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Practical laboratory exercises include; • Hardwiring electro-pneumatic circuits, direct and indirect wiring of contactors, timer blocks. • Constructing hydraulic circuits to control various cylinder movements • Trouble shooting on a problematic circuits, with build in errors • Torque V's Load tests, locked rotor tests on motors • Testing a 3 phase motor • Basic programming of VSD • Lock-Out Tag-Out exercises • Demonstration of Star-Delta wiring, and start-up	2,3,4	10.00	Sem 1 End

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	A final written examination will assess the extent to which the student has achieved the module learning outcomes	1,2,3,4,5	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	3.00
Laboratory	Every Week	1.50
Estimated Learner Hours	Every Week	2.00
	Total Hours	6.50