Wrexham glyndŵr UNIVERSITY

MODULE SPECIFICATION PROFORMA

Module Title:	**Instrumentation & Process Control**	**Level**:	5	**Credit Value**:	20

Module code:	ENG52A	**Is this a new module?** Yes	**Code of module being replaced**:	

Cost Centre:	GAME	**JACS3 code**:	H661

Trimester(s) in which to be offered:	1, 2 & 3	**With effect from:**	September 16

School:	Applied Science, Computing & Engineering	**Module Leader:**	James Robinson

Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
FdEng Industrial Engineering	☐	✓

Pre-requisites
None

Derogations
A derogation from regulations has been approved for this module which means that whilst the pass mark is 40%, each element of assessment requires a minimum mark of 30% for the module to be passed overall.

Office use only

Initial approval June 16

APSC approval of modification *Enter date of approval* Version 1

Have any derogations received SQC approval? Yes ✓ No ☐

Module Aims
The module aims to develop the understanding of the concepts of instrumentation and control and have acquired knowledge relating to the characteristics and properties of the variables being measured. Also to develop knowledge of the essential principles, components, applications and terminology used in control engineering hence to develop the concepts of three-term PID (Proportional, Integral and Derivative action) industrial control.

Intended Learning Outcomes

Key skills for employability

KS1	Written, oral and media communication skills
KS2	Leadership, team working and networking skills
KS3	Opportunity, creativity and problem solving skills
KS4	Information technology skills and digital literacy
KS5	Information management skills
KS6	Research skills
KS7	Intercultural and sustainability skills
KS8	Career management skills
KS9	Learning to learn (managing personal and professional development, self-management)
KS10	Numeracy

At the end of this module, students will be able to		Key Skills	
1	Apply knowledge and understanding gained from theoretical work and investigative work to solve experimental problems	KS5	
2	Demonstrate a thorough understanding of control engineering concepts	KS5	
3	Evaluate instruments, from manufacturers' data and principles of operation, in order to determine the most appropriate technology for a given application	KS6	
4	Select from a range of analysis methods and possible solutions to suit different practical analysis and design situations	KS3	

Assessment:

Assessment 1 - A Case Study should be made which examines several technologies for measuring the same measurement and. Manufacturers' recommendations and their own case studies should be examined with findings summarised into advantages/disadvantages, this should be completed in conjunction with experimental work in order to prove/disprove manufacturers claims.

Assessment 2 - Computer simulations should be completed, utilising appropriate software, in order to reaffirm control principles. Several simulations should be undertaken, the results of which should be compiled into a document along with the students interpretation and analysis of the results.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	2,3 & 4	Case Study	50		2000
2	1 & 2	Simulation	50		2000

Learning and Teaching Strategies:

Lectures - presentation of theory, facts and concepts, relating to instrumentation, in order to convey critical information. Interaction or active learning should be implemented to develop an understanding of principles and concepts and stimulate discussion.

Demonstrations – Laboratory experiments performed in order to demonstrate instrument characteristics.

Specialist knowledge and expertise from industrial partners can and will be disseminated to other students where relevant.

Computer Labs – Use of software in order to aid development of understanding and to implement software simulations.

Syllabus outline:

- Define process variables – mass flow, volumetric flow, pressure, dynamic pressure, viscosity, turbidity etc;
- Develop formulae showing the inter-relationship between process variables and their effects upon measuring systems and instrumentation;
- Analyse instrument devices (flow level pressure etc.) and develop an understanding of their operation, construction and application;

- Determine, implement and commission a system of measurement for a given process variable;
- Analyse system performance (system Lag, errors, repeatability, effects of disturbance etc.) and produce a specification for the system (limitations, range, accuracy/confidence level, etc.);
- Examine compensation techniques used with instrumentation to produce a linear output from an instrument;
- PLC basic principles, purpose and implementation methods, Logic and programming methods overview, interfacing with field devices, understanding of further capabilities.
- Produce block diagrams of practical control processes, analyse diagrams and produce transfer functions;
- Develop the concepts of PID control and determine the effects upon a process for each aspect of P, I and D methods.

Bibliography:

Essential reading

William, D. (2005) *Fundamentals of Industrial instrumentation and Process Control*. McGraw-Hill Education

Altmann, W. (2005)*Practical Process Control for Engineering Technicians*, Elsevier Science and Technology

Other indicative reading

Nise, N.S. (2011) *Control Systems Engineering*, John Wiley & Sons

Dickson, M. (2011) *Introduction to Control Engineering*, Elektor Electronics Publishing

Morris, A.S. (2011) *Measurement and Instrumentation Theory and Application*, Academic Press