HEA – 01

UNIVERSITI MALAYSIA PERLIS

BORANG PENAWARAN KURSUS BARU

Pusat Pengajian/Pusat : Pusat Pengajian Kejuruteraan Mekatronik

(1) **Kod kursus/** *Course code*: ENT286
(2) **Tajuk kursus**/ *Course title*: Instrumentasi dan Pengukuran / Instrumentation and Measurement
(3) **Nilai unit**/ *Number of unit*: 3
(4) **Jenis kursus**/ *Course type*: Teras / Core
(5) **Prasyarat**/ *Prerequisite***:** Tiada / None
(6) **Sinopsis kursus**/ *Course synopsis*: This course provides the knowledge of measurement and instrumentation with various transducers and techniques involving physical phenomena. This includes an overview of general measurement system, errors and signal characteristics, followed by diverse type of sensors and their application in measuring electronics signal, temperatures, humidity, displacement as well as velocity and acceleration, force, torques strain and stress and also the flow rate measurement. The use of computer for interfacing application is also covered in this course.
(7) **Senarai eksperimen**/ *List of experiments*: Laboratory 1 : Electrical Measurement and its signal properties Laboratory 2 : Temperature measurement using various temperature sensors and interfacing with DAQ Laboratory 3 : Flow and level measurement
(8) **Pendekatan pembelajaran**/ *Learning approach*: *(sbg. contoh – kuliah, seminar, amali, lawatan, tutorial, dll. Sila nyatakan sekali bilangan jam)* (i) Lecture : 36 hours (75 %) (ii) Tutorial : 6 hours (12.5 %) (iii) Laboratory : 6 hours (12.5 %)
(9) **Kali pertama penawaran kursus**/ *First time course offered***:** Semester 1, Academic Session 2011/2012

(10) Matriks Hasil Pembelajaran/*Course Outcome Matrix*

Course Outcome (CO)	Domain and taxonomy levels	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Possible Assessment
		C	C CTPS	C CTPS	P	P	EM	ES	EM	TS LS	CS	LL	ES	
CO1: Ability to explain basic concepts of transducers, sensors and measurement techniques and errors in measurement	**C4**	√	√	-	-	-	-	-	-	-	-	-	-	Assignment, Quiz, Examination
CO2: Ability to apply interfacing concept between transducers, computer and signals obtained from measurement techniques	**C5**	√	√	-	√	-	-	-	-	-	-	-	-	Assignment, Quiz, Examination
CO3: Ability to design measurement system using suitable sensors and transducers	**C6**	√	√	-	√	-	-	-	-	-	-	-	-	Assignment, Quiz, Examination
CO4: Ability to use software to solve Instrumentation and measurement problems	**P4**	-	-	-	√	√	-	-	-	-	-	-	-	Laboratory

Note : √ certain CO is relevant to that PO

(11) **Panduan Rancangan Mengajar**/*Teaching Plan Guide*

Study Week	Course Content	Delivery Mode	Level of Complexity	Possible Assessment
1	**Introduction to Instrumentation and Measurement** Introduction to the understanding of basic terms and elements in measurements, importance of sensors and transducers as well as bridges. Applications of measurement in everyday's life. **(3 Hours)**	Lecture		
2	**Measurement Planning & Error Analysis** Concepts and principles of measurement and error analysis. Various types of errors. Concepts and principles of measurement in the laboratory experiment. **(3 hours)**	Lecture		
3	**Statistical Measurement Theory** Concepts and principles of statistical measurement theory. Introduction to the probability and statistics. **(2 hours)**	Lecture		
	Quiz 1 (Week 3)	Problem Solving	**C4: Analysis**	Quiz
	Tutorial 1 (Week 3) **(2 Hours)**	Problem Solving	-	-
4-5	**Signal Characteristic and Conditioning** Concepts and various types of signals. Signal mathematical properties. Principle of signal conditioning. The use of different signal conditioners such as filters and amplifiers. Basic concept of ADC and DAC. **(5 Hours)**	Lecture		
	Lab 1 (Week 5) **(2 Hours)**	Laboratory experiment	**C4: Analysis**	Report, Test
	Assignment 1 (week 5)	Problem Solving	**C4: Analysis**	Assignment
6	**DAQ Systems and Data Interfacing** Principles of sensors & transducers. Introduction to DAQ systems. Various types of sensors and transducers in general measurement system. Interfacing the sensors with the real world. **(3 Hours)**	Lecture		
	Quiz 2 (Week 6)	Problem Solving	**C4: Analysis**	Quiz
7	**Electrical-based Instrumentation** Measurements of voltage, current, resistance, power and capacitance. Various types of bridges used for measurement. **(3 Hours)**	Lecture		
	Mid Term Examination (Week 7)	Examination	**C6: Evaluation**	Examination
8	**Temperature and Humidity Measurement** Concepts of temperature measurement. Various sensors used in temperature measurement such as thermocouple, RTD, thermistor and bimetal. Introduction to psychrometry and humidity measurement using various sensors. **(2 Hours)**	Lecture		
	Lab 2 (Week 8) **(2 Hours)**	Laboratory experiment	**C4: Analysis**	Report, Test
9-10	**Displacement, Velocity & Acceleration Measurements** Measurement of position, velocity and acceleration. Various methods and sensors used for position, velocity and acceleration: Doppler Radar Velocity Measurement, Tachometers, magnetic pickup,	Lecture		

	stroboscopic and photoelectric tachometers. **(5 Hours)**			
	Tutorial 2 (Week 9) **(2 Hours)**	Problem Solving	-	-
11-12	**<u>Force & Torque Measurements, Stress & Strain Measurement</u>** Measurement of force, torque measurement, stress and strain. Various methods and sensors use for force, torque measurement, stress and strain. **(6 Hours)**	Lecture		
	Quiz 3 (Week 11)	Problem Solving	**C4: Analysis**	Quiz
	Assignment 2 (week 12)	Problem Solving	**C4: Analysis**	Assignment
13-14	**<u>Fluid Flow Instrumentation</u>** Measurement of pressure and flowrate measurement. Bernoulli's equation and continuity equation. Various types of sensors for pressure and flowrate measurement. **(4 Hours)**	Lecture		
	Lab 3 (Week 13) **(2 Hours)**	Laboratory experiment	**C4: Analysis**	Report, Test
	Tutorial 3 (Week 14) **(2 Hours)**	Problem Solving	**-**	-
15	**MINGGU ULANGKAJI** / *REVISION WEEK*			
16-17	**PEPERIKSAAN AKHIR SEMESTER** / *FINAL EXAMINATION*			

Projek Untuk Pembelajaran Berasaskan Masalah (PBL) – jika berkenaan
Problem-based learning (PBL) projects – where relevant

Bil.	Projek
	Nil

(12) **Sumbangan penilaian**/ *Evaluation contribution:*

(i) **Peperiksaan**/ Examination: **70%**

- **Mid Term Examination =10%**
- **Final Examination = 60%**

(ii) **Penilaian Berterusan**/Continual Assessment: **30%**

- **Assignments**
- **Quizzes**
- **Laboratory**

(13) **Tenaga pengajar untuk kali pertama penawaran kursus**/ *Teaching staff during the first time course offered:*

Lecturer	**PLV**
En. Abdul Halim Ismail	Pn. Norazila Shoib
Pn. Nur Liyana Tajul Lilie	Cik Farah Hannan Mohd Faudzi

(14) **Jumlah pelajar yang dijangkakan untuk kali pertama penawaran kursus**/ N*umber of students expected during the first time course offered:* 100 pelajar

(15) **Senarai rujukan**/ *List of references* **:** *(*Dahulukan dengan rujukan yang utama/ *list main texts/references first*)

1. Anthony J.W., Ahmad R.G., "Introduction to Engineering Experimentation", 3rd Ed., Prentice Hall, 2010
2. Bentley, J.P., "Principles of Measurement Systems", 4th Edition, Prentice Hall, 2005.
3. Johnson, C., "Process Control Instrumentation Technology", 8th Edition, Prentice Hall, 2006.
4. Doebelin, E.O., "Measurement System: Application and Design", Mc Graw Hill, 2004.
5. Sinclair, I., "Sensors and Transducers", 3rd Edition, Newnes, 2001.

(16) **Nota**/ *Notes* (Catatkan di sini maklumat lain yang berkenaan mengenai kursus ini, sekiranya ada)

Nil

(17) **Tandatangan & Kelulusan**/ *Signatures & approvals*

Pencetus : Abdul Halim Ismail (02.08.2011)

Dikemaskini oleh:

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Dr. Marwan Affandi	(Penolong Pendaftar	(Dekan/Pengarah)
Tarikh : 19.7.2013	Pusat Pengajian/Pusat)	Prof. Dr. Abdul Hamid Adom
	Farah Marzuliana bt Mat	Tarikh :
	Tarikh:	Cop Rasmi:
	Cop Rasmi :	

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(Dekan Pengurusan Akademik)
Tarikh :
Cop Rasmi: