Department of Industrial Engineering
and Logistics Management

IELM 2100S: COMPUTING IN INDUSTRIAL APPLICATIONS
(Spring Semester 2018 Course Vector: 2-0-3:3)

[Updated are highlighted in YELLOW]

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Aims:

To equip IELM students with the knowledge of micro-processor controls and automations so that you are confident to work in high value added industries such as RFID systems, medical devices, and high end consumer products.

Learning Philosophy:

Successful IELM graduates are creative in using advanced technology. Creativity is about making new and original associations among different technologies. This course will provide hands on experience on automation technology.

Course Learning outcomes: after this course, students should be able to:

Knowledge/Content Related:

(i) acquire and practice the ability to design, construct, analyze and critique a simple control system with sensor and actuators;

(ii) acquire and practice the ability to identify, compare and contrast the basic architecture of different computers;

Academic Skills/Competencies:

(iii) acquire and practice the ability to program a Programmable Logic Controller to perform some automated tasks;

(iv) practice the ability to solve automation technology problems through self-learning

Lectures: Thu 15:00 – 16:50, Rm6602
Labs: Mon, 16:30 - 19:20, IA Lab (Rm 4223)

Office hours: appointments via e-mails (rhyso@ust.hk)

Reference Text:

This is a lab-based course and full lecture notes and laboratory instructions have been written and will be put on the course Web site.

Supplementary Reading:

Jacob, J.M. (1988) Industrial control electronics: application and design. Prentice Hall. ISBN 0-13-459306-5. (TK7881.2 J33 1988).

Phipps, C.A. (1995) Fundamentals of Electrical Control. The Fairmont Press Inc. ISBN 0-13-504846-X. (TK 7881.2 P55 1995).

Smith, E. and Vivian, B.E. (1995) An introductory guide to valve selection. Mechanical Engineering Publications Limited, London. ISBN 0-85298-914-8. (TJ 223 V3 S65 1995).

Course Grading:

Mid-Term Exam	20%	(Open-book exam.)
Final Exam	34%	(Open-book exam.)
Lab. work	35%	(**NO copying ***)
Class & Lab Participation	5%	
Assignments		
Assignment 1	2%	(**NO copying ***)
Assignment 2	4%	(**NO copying ***)
	100%	

Course Syllabus

* Heavy penalty for copying!!

	Lecture	Lab session
Wk1a	Thu (1/2) **Topic 1: Introduction to Automation** - automation in HK - components & structures of automated systems - course overview + intro to lab.	Mon (29/1) – no lab
Wk1b	Thu (8/2) ***<Intro. to Assignment One>*** **Topic 2: Pneumatic Control** - usage in HK - basic components - symbols & circuit diagram	Mon (5/2) - Lab#1: Design & build a pneumatic control door (IA lab, Rm4223)
Wk2	Thu (15/2) … continue Topic 2 **Topic 3: Sensors, transducers, & transceivers** - definitions & usage in HK - types & characteristics - working principles	Mon (12/2) – 4pm Intro Talk on E-session (Rm2304)
Wk3	Thu (22/2) … continue Topic 3	Mon (19/2) – no lab CNY holidays
Wk4	Thu (1/3) **Topic 4: Ladder Logic & PLC** - basic PLC hardware - ladder logic diagram for circuit design - ladder logic as a programming tool - case studies & exercises <Deadline for Assignment One>	Mon (26/2) - lab#2: Design & build automatic door with safety sensors
Wk5	Thu (8/3) … continue Topic 4	Mon (5/3) - lab#4: Mission Impossible! Part II - a FUN lab to illustrate the importance of circuit diagrams
Wk6	Thu (15/3) …Continue Topic 4 ***<Intro. to Assignment 2>***	Mon (12/3) - lab#4: Mission Impossible! Part II - a FUN lab to illustrate the importance of circuit diagrams

	Lecture	Lab session
Wk7	Thu (22/3) - **Topic 5: Electro-magnetic Actuation** - usage in HK - types of motors & relays - stepping motors & servo motors	Mon (19/3) - lab#5: first exercise with PLC
Wk8a	Thu (29/3) – Continue Topic 5 ***<Deadline for Assignment Two>***	Fri (26/3) - lab#6: design & build an automatic material selection system – Part I
Wk8b	Thu (5/4) - No lecture (Ching Ming Festival)	Mon (2/4) – no lab Easter Monday
Wk9	Thu (12/4) – **<<Mid-term Examination>>** 3pm to 5pm	Mon (9/4) - lab#7: design & build an automatic material selection system - Part II
Wk10	Tue (19/4) - **Topic 6: Analogue, Digital & Micro-processor Controls** - basics of digital signals - architecture of a PC - standard I/O interfaces of a PC	Mon (16/4) - lab#8 [Lab #8: design & build a PLC-control traffic light - Part I]
Wk11	Thu (26/4) - Continue Topic 6	Mon (23/4) -lab#9: design & build a PLC-control traffic light - Part II
Wk12	Thu (3/5) - Continue Topic 6	Mon (30/4) - RFID hands-on exercise
Wk13	Study break followed by Final Examination	Mon (7/5) – no lab

NB: Lecture notes and lab instructions can be downloaded from
"https://www.ielm.ust.hk/dfaculty/so"
(username and password will be announced in class)