**Course Name**: Basic Programmable Logic Controller  
**Course Code**: BEE2931  
**Pre Requisite**: -  
**Course Type**: Core Program  
**Semester Offered**:  
- BEE – Year 2 Semester 1  
- BEP – Year 2 Semester 1  
- BEC – Year 2 Semester 1

**Credit Hour**: 1  
**Lecture Hours**: -  
**Tutorial Hours**: -  
**Lab Hours**: 2

**Synopsis**: This course covered the fundamental of Programmable Logic Controller (PLC) including input and output component, memory address, wiring diagram, troubleshooting and design of ladder diagram.

**Course Outcomes**: At the end of this course, students should be able to:

- **CO1**: Explain the principle, operation and function of PLC.  
- **CO2**: Identify PLC hardware and software configuration.  
- **CO3**: Construct control operation system for specific task using PLC.  
- **CO4**: Trace the problems in PLC programming implementation.

**CO/PO Mapping**

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**Syllabus**

1.0 **Introduction to Programmable Logic Control (1 hours)**

- 1.1 Principle of control system  
- 1.2 Background and development of PLC  
  - 1.2.1 Advantage and disadvantage  
  - 1.2.2 Type of PLC  
  - 1.2.3 PLC operation  
  - 1.2.4 Application of PLC  

  (BT Level 1: Remembering)

2.0 **PLC hardware configuration (2 hours)**

- 2.1 Power supply unit
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(BT Level 3: Applying)

### 3.0 PLC system wiring and connection (1 hours)
- 3.1 PLC safety protection devices
- 3.2 Power supply unit wiring
- 3.3 I/O Unit Wiring
  - 3.3.1 External relay
  - 3.3.2 Discrete Input/Output

(BT Level 3: Applying)

### 4.0 PLC programming software (1 hours)
- 4.1 Introduction to Programming Software
  - 4.1.1 Menu Overview
  - 4.1.2 Symbol representation
  - 4.1.3 Relay to ladder diagram
  - 4.1.4 Logic gate to ladder diagram
- 4.2 Hardware and software integration
  - 4.2.1 Offline environment
  - 4.2.2 Online environment

(BT Level 3: Applying)

### 5.0 Basic Programming application (4 hours)
- 5.1 AND and OR application
- 5.2 Holding circuit
  - 5.2.1 Internal relay
  - 5.2.2 KEEP
  - 5.2.3 SET AND RESET
- 5.3 TIMER and COUNTER

(BT Level 3: Applying)

### 6.0 Intermediate Programming application (5 hours)
- 6.1 DIFFERENTIAL UP/DIFFERENTIAL DOWN (DIFU/DIFD)
- 6.2 SHIFT REGISTER
- 6.3 MOVE AND COMPARE
- 6.4 INTERLOCKING

(BT Level 3: Applying)

### References
3. OMRON “Sysmac CQM1H Series Operation Manual”, Revised August 2005
Assessment

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Teaching Approach
Theoretical Briefing, Group Exercise, Design Applications

Course Homepage
http://notes.ump.edu.my/fkee/BEE1941