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| **Shoubra Faculty of Engineering** | Course Specifications : programmable logic controller plc |  |
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| **University** : Benha university |

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| **Faculty** : Shoubra Faculty of Engineering |

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| **Department** : Mechanical Engineering Department |

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| **1- Course Data** |
| |  |  |  |  | | --- | --- | --- | --- | | Course Code : MDP443 | Course Title : programmable logic controller plc | Study Year : Fourth Year | | | Specialization : |  | | | | Teaching Hours: | | | | | Lecture : 3 | Tutorial : 2 | Practical : |  | |

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| **2-  Course Aim** |
| For students undertaking this course, the aims are to: |
| |  | | --- | | 2.1- Put technical specification and data sheet of PLCs | | 2.2- Analyze any logic problems and write the logic equations | | 2.3- Convert the logic equation into ladder diagrams, Statement list or function block | | 2.4- Write PLC ladder program which include Logic, timers, counters and mathematical‎ | |

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| **3- Intended Learning Outcomes of Course (ILOS)** |
| |  | | --- | | **a-  Knowledge and Understanding** | | On completing this course, students will be able to: | | |  | | --- | | 1- Define terminologies used inengineering related toPLC. (A.3). | | a- 2- Demonstrate and understand the basic principles ofthe PLC, Input devices‎, Output devices and ‎actuators , PLC logic. (A5) | | a- 3 - Basic electrical, control and computer engineering subjects related to the PLC.‎ (A4) | | a- 4 - Engineering design principles and techniques used in PLC.‎ (A11) | | |  | | | **b-  Intellectual Skills** |  | | At the end of this course, the students will be able to: |  | | |  |  | | --- | --- | | b- 1 - Assess the differences between Input devices, and Output devices.(B1) |  | | b- 2 –describe the different steps to get Ladder diagram ‎programs (B.6). |  | | b- 3 - Investigate the PLCs sensors (B.8).  b- 4) Solve engineering problems, often on the basis of limited and possibly contradicting information(B7). |  | |  |  | |  |  | |  | |  | | | **c-  Professional Skills** |  | | On completing this course, the students are expected to be able to: |  | | |  | | --- | | c- 1 - Create and/or re-design a process, component or system, and carry out specialized engineering designs (C.2). | | c- 2 - Exchange knowledge and skills with engineering community and industry(C.1). | | c- 3 - Write computer programs pertaining to mechanical power and energy engineering (C.7). | |  | |  | | | **d-  General Skills** |  | | At the end of this course, the students will be able to: |  | | |  | | --- | | d- 1) Collaborate effectively within multidisciplinary team(D1). | | d- 2) Work in stressful environment and within constraints(D2). | | d- 3) Communicate effectively(D3). | |  | |  | | |

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| **4- Course Contents** |
| |  |  | | --- | --- | | **No.** | **Topics** | | 1 | Introduction to PLC ‎structure.,‎ | | 2 | Input devices ‎ | | 3 | Output devices and ‎actuators , PLC logic ‎ | | 4 | Ladder diagram ‎programming ‎ | | 5 | Ladder Programming ‎application and case ‎studies ‎ | | 6 | PLCs sensors | | 7 | PLC logic ad K map | | 8 | Timers applications | | 9 | Timers applications | | 10 | Master control relay application | | 11 | Internal relays, Shift registers, Data handling | | 12 | mathematical application of PLC process | | 13 | Test and debugging | |

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| **5- Teaching and Learning Methods** |
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| **6- Teaching and Learning Methods of Disables** |
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| **7- Student Assessment** |
| |  | | --- | | **a- Student Assessment Methods** | | |  |  | | --- | --- | | 1 | Assignments ‎  to assess   knowledge and intellectual skills. ‎ | | 2 | Quiz ‎  to assess   knowledge, intellectual and professional skills‎ | | 3 | Mid-term ‎  to assess   knowledge, intellectual, professional and general skills. ‎ | | 4 | Oral exam‎  to assess   knowledge and intellectual skills. ‎ | | 5 | Final exam ‎  to assess   knowledge, intellectual, professional and general skills.‎ | | 6 | reports  to assess   knowledge and experience gained | | |  | | | **b- Assessment Schedule** |  | | |  |  |  | | --- | --- | --- | | **No.** | **Assessment** | **Week** | | 1 | Assignments ‎ | ‎1, 5, 7, 10, 11, 12, and 13 ‎ | | 2 | Quizzes ‎ | 5, 10 | | 3 | Mid-term | 8 | | 4 | Oral Exam ‎ | 14 | | 5 | Final exam ‎ | 15 | |  | |  | | | **c- Weighting of Assessments** |  | | |  |  | | --- | --- | | **Assessment** | **Weight** | | Mid\_Term Examination | 10 % | | Final\_Term Examination | 60 % | | Oral Examination | 10 % | | Practical Examination | 10 % | | Semester work | 10 % | | Other types of assessment | 0 % | | Total | 100 % | |  | |  | | |

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| **8- List of References** |
| |  | | --- | | **a- Course Notes** | | |  | | --- | | 1- Course Power point presentation prepared by instructor. ‎ | | | **b- Books** | | |  | | --- | | 1- Programming Logic Controllers: The Industrial Computers by Costanzo, 2009‎ | | | **c- Recommended Books** | | |  | | --- | | 1- PLC device and Logic Controllers by Perez, Prentice Hall 2009‎ | |   **-Course Coordinator :    Saber abdraboo**  **- Head of Department : Ahmed Maged Ahmed Osman** |



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| **Matrix of Knowledge and Skills of the course** |
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| **- Course Coordinator :    Saber abdraboo** |
| **- Head of Department : Ahmed Maged Ahmed Osman**  **Matrix of course content and ILO’s**  **Course Title**: programmable logic controller plc **Code**: MDP443 **Lecture**: 3 **Tutorial:** 2 **Practical**: **Total:**  5  **Program on which the course is given:** B.Sc. Mechanical production Engineering  **Major or minor element of program:** N.A.  **Department offering the program:** Mechanical EngineeringDepartment  **Department offering the course:** Mechanical EngineeringDepartment  **Academic year / level: 2013-2014 First Year / first semester**  **Date of specifications approval:** 16/3/2010   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Course contents** | **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **b3** | **b4** | **c1** | **c2** | **c3** | **d1** | **d2** | **d3** | | Introduction to PLC ‎structure.,‎ | ✓ |  |  |  | ✓ |  |  | ✓ | ✓ |  |  |  |  |  | | Input devices ‎ |  | ✓ |  |  | ✓ |  |  |  |  |  | ✓ | ✓ |  |  | | Output devices and ‎actuators , PLC logic ‎ |  |  |  |  |  |  |  | ✓ |  |  | ✓ | ✓ |  |  | | Ladder diagram ‎programming ‎ |  | ✓ | ✓ |  |  | ✓ |  |  |  |  |  | ✓ |  |  | | Ladder Programming ‎application and case ‎studies ‎ |  |  |  | ✓ |  |  |  | ✓ |  | ✓ | ✓ | ✓ |  |  | | PLCs sensors |  |  |  |  | ✓ |  |  |  | ✓ | ✓ |  | ✓ |  |  | | PLC logic ad K map |  | ✓ |  |  | ✓ |  |  |  | ✓ |  |  | ✓ |  |  | | Timers applications | ✓ |  |  | ✓ |  |  |  |  | ✓ |  |  | ✓ |  |  | | Timers applications |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | Master control relay application |  |  |  |  |  |  |  |  | ✓ |  | ✓ |  |  | ✓ | | Internal relays, Shift registers, Data handling |  |  | ✓ | ✓ |  |  |  |  | ✓ | ✓ |  | ✓ |  |  | | mathematical application of PLC process | ✓ |  | ✓ |  |  |  |  |  |  | ✓ |  |  |  | ✓ | | Test and debugging | ✓ | ✓ |  |  |  |  |  |  |  |  |  |  | ✓ |  | | Introduction to PLC ‎structure.,‎ |  |  | ✓ |  |  |  |  |  |  |  | ✓ | ✓ |  |  |     **Matrix of course aims and ILO’s**  **Course Title** programmable logic controller plc **Code**: MDP443 **Lecture**: 3 **Tutorial:** 2 **Practical**: **Total:**  5  **Program on which the course is given:** B.Sc. Mechanical production Engineering  **Major or minor element of program:** Major.  **Department offering the program:** Mechanical EngineeringDepartment **Department offering the course:** Mechanical EngineeringDepartment  **Academic year / level: 2013-2014 First Year / first semester**  **Date of specifications approval:** 16/3/2010   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Course aims** | **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **b3** | **b4** | **c1** | **c2** | **c3** | **d1** | **d2** | **d3** | | 2.1- Put technical specification and data sheet of PLCs | ✓ |  | ✓ |  |  | ✓ |  | ✓ |  |  |  | ✓ |  |  | | 2.2- Analyze any logic problems and write the logic equations |  | ✓ |  | ✓ |  |  | ✓ |  | ✓ |  | ✓ |  | ✓ |  | | 2.3- Convert the logic equation into ladder diagrams, Statement list or function block | ✓ |  | ✓ |  |  | ✓ |  |  | ✓ |  |  | ✓ |  | ✓ | | 2.4- Write PLC ladder program which include Logic, timers, counters and mathematical‎ |  | ✓ |  | ✓ |  | ✓ | ✓ |  | ✓ |  | ✓ |  |  |  |      |  | | --- | | **- Course Coordinator : Saber abdraboo** |   **- Head of Department : Ahmed Maged Ahmed Maged** |