King Fahd University of Petroleum & Minerals
Electrical Engineering Department
Course Syllabus – Tentative Schedule – Semester 042

Title of the Course: **EE446 Programmable Logic Controllers** **Credit Hours: 3.0**
Resources Needed: Material provided by the Instructor

Instructor: **Dr. Mahmoud Kassas** Office: **14-270** Phone: **2271** Email: mkassas@kfupm.edu.sa
Office Hours: **Sunday-Monday-Tuesday:** **11:00-11:50AM**

Course Goal: To familiarize the student with fundamentals of programmable logic controllers, including the design and implementation of basic PLC ladder diagrams.

I. Subject to be cover in class[1]:

- Basic Concepts of Programmable Logic Controllers.
- The Structure of Programmable Logic Controllers.
- Basic Functions:
  a. Binary Logic Operations.
  b. Memory Operations.
  c. Timer & Counter Operations.
  d. Data Types & Data Transfer Functions.
- Digital Functions:
  - Compare Functions.
  - Arithmetic Functions.
  - Math Functions.
  - Conversion Functions.
  - Logic Functions.
- Program Flow Control:
  - Status Bits.
  - Jump Functions.
  - Master Control Relays.
  - Block Functions.
- Analog Processing:
  - Digital-to-Analog Conversion.
  - Analog-to-Digital Conversion.

II. Major Exam (15 points):

- There is major exam. Grading the major exam problems may be associated with problems implementation in the lab.

III. Homework & Quizzes (15 points):

- The same lab group must conduct homework. Each problem must be tested on the PLC systems. Any similarity between two groups homework will lead to zero for both groups.

IV. Laboratory[2] (25 points):

- Introduction to Programmable Logic Controller.
- Programmable Logic Controller Basic Instructions.
- Digital Functions.
- Arithmetic Functions.
- Program Flow Control Functions.
- Practical Automation Systems from Industry.

V. Projects (15 points):

- Each three students must form a group to design and implement a class project. The project must be presented in the class at the end of the semester. Alternative form the project is to present an existing industrial plant automation systems.

VI. Final Exam (30 points):

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[1] There is no specific textbook. Material will be handed to you in form of handouts.

[2] Siemens S7-PLC will be used mainly and Logo PLC as an extra tools in the projects.

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EE446 – LAB Schedule - Tentative

Week 2:	Lab1: Introduction to Lab Equipments and Siemens Trainer System.
Week 3:	Lab2: Hardware Configuration for Training Station.
Week 4:	Lab3: Boolean Operation and Their Applications.
Week 5:	Lab4: Timer Functions with Exercises.
Week 6:	Lab5: Loading and Transferring Data & Counter Functions with Applications.
Week 7:	Field Trips
Week 8:	Lab6: Conversion Operation & Basic Mathematical Functions.
Week 9:	Lab7: PLC Programming Application I.
Week 10:	Lab8: PLC Programming Application II Flashing and Traffic Lights.
Week 11:	Lab9: Using Function “FC”.
Week 12:	Lab10: Solenoid Valve.
Week 13:	Field Trips.
Week 14:	Lab final exam.
Week 15:	Presentation for projects