1. **Course number and name**
   COE 431 – Industrial Computer Systems

2. **Credits and contact hours**
   3 credit hours, 4 contact hours

3. **Instructor's or course coordinator's name**
   Dr. Abdul-Rahman Al-Ali

4. **Textbook, title, author, and year**
   None

   Other supplemental materials
   Handouts and reading materials

5. **Specific course information**
   a. **Brief description of content of the course (catalog description)**
      Covers microprocessor-based data acquisition units and their industrial applications; programmable logic controllers and their industrial applications; web-based monitoring and control of industrial plants. Include a class project.

   b. **Prerequisites or co-requisites**
      Prerequisites: COE 410 (Embedded Systems: Design and Applications) or ELE 341 (Electronics II)

   c. **Indicate whether a required, elective, or selected elective course in the program**
      Selected Elective

6. **Specific goals for the course**
   a. **Specific outcomes of instruction**
      This course requires the student to demonstrate the following:
      1. Data acquisition units' architectures, selections, interfacing and programming
      2. Programmable Logic Controllers units' architectures, selections, interfacing and programming
      3. Design an industrial automation system using programmable logic controllers
      4. Design an industrial automation system using PC based hardware
      5. Remote monitoring and control industrial process via the World Wide Web.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

This course contributes in a significant way to the accomplishment of the following program outcomes:

Program outcome	Emphasis in this course
(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	◑
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	●
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	◑
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	○
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	◑
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	○
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	◑

Emphasis: ● High; ◑ Medium; ○ Low; Blank – Nothing Specific Expected

7. Brief list of topics to be covered
    i.   Programmable logic controllers: Hardware architecture
    ii.   Programmable logic controllers: Software architecture
    iii.   Design automation systems using PLC
    iv.   PLC Communications: MPI, PROFIBUS
    v.   Real-time industrial process
    vi.   Projects explanation, assignment and implementation
    vii.   Basic building blocks of data acquisition unit (DAQ)
    viii.   Programming and Interfacing data acquisition unit to the PC
    ix.   Applications of LabVIEW