Course Outline

Department: ELEC  Number: 444
Course Title: Automated Process Control System Design  Units: 4.0
Hours/Week: Lecture: 3  Lab: 3  By Arrangement: 0
Length of Course  Gradning
☒ Semester-long  ☒ Letter
☐ Short course (Number of weeks ___)  ☐ Credit/No Credit
☐ Open entry/Open exit  ☐ Grade Option (letter or Credit/No Credit)

1. Prerequisite (Attach Enrollment Limitation Validation Form.)
   Completion of ELEC 442 with a grade of C or better or equivalent

2. Corequisite (Attach Enrollment Limitation Validation Form.)
   None

3. Recommended Preparation (Attach Enrollment Validation Form.)
   None

4. Catalog Description (Include prerequisites/corequisites/recommended preparation.)
   A practical course in process control system design and tuning. Integration of sensors, transmitters, indicators, controllers and final control elements. Documentation of system (P&ID), control loop theory, PID, loop tuning, and control loop troubleshooting are stressed (CSU)

5. Class Schedule Description (Include prerequisites/corequisites/recommended preparation.)
   Same as above

6. Student Learning Outcomes (Identify 1-6 expected learner outcomes using active verbs.)
   Upon successful completion of the course, the student will be able to:
   1. Layout and spec the equipment needed for a basic feedback control system
   2. layout and spec the equipment needed for a basic feedback control system
   3. layout and spec the equipment needed for a basic cascade and ratio control system
   4. demonstrate skill using piping and instrumentation diagram (P&ID)
   5. explain SCADA system operation
   6. demonstrate a distributed control system
7. **Course Objectives** (Identify specific teaching objectives detailing course content and activities. *For some courses, the course objectives will be the same as the student learning outcomes. If this is the case, please simply indicate this in this section*).

   Same as above

8. **Course Content** (Brief but complete topical outline of the course that includes major subject areas [1-2 pages]. Should reflect all course objectives listed above. In addition, you may attach a sample course syllabus with a timeline.)

   1. Review of feedback control
   2. process control modes
   3. process characteristics
   4. process variables
   5. instrumentation symbols
   6. instrument loop diagrams
   7. process and instrumentation diagrams
   8. sensor and transmitter selection
   9. pneumatic and electronic controllers, indicators, and recorders
   10. tuning basics
   11. proportional tuning
   12. integral tuning
   13. proportional and integral tuning
   14. derivative tuning
   15. proportional and derivative tuning
   16. proportional, integral, and derivative tuning
   17. instrument loop troubleshooting
   18. introduction to distributed control
   19. DCS maintenance
   20. Data communications
   21. Data communications maintenance
   22. networking and fiber optics
   23. fundamental of batch processes
   24. principals of continuous process control
   25. Systems simulation using AUTOSIM—Process control software lab
   26. system documentation using AutoCAD Lite and Appropriate Instrumentation/process Control symbol Library

9. **Representative Instructional Methods** (Describe instructor-initiated teaching strategies that will assist students in meeting course objectives. Include examples of out-of-class assignments, required reading and writing assignments, and methods for teaching critical thinking skills.)

   1. Lectures
   2. Analytical problem sets
   3. essay question sheets
   4. topic reading assignments
   5. assigned computer simulation activities

10. **Representative Methods of Evaluation** (Describe measurement of student progress toward course objectives. Courses with required writing component and/or problem-solving emphasis must reflect critical thinking component. If skills class, then applied skills.)

    1. Graded problem sets
    2. graded homework word problems
3. computer based simulation activities
4. quizzes
5. midterm exam
6. Final exam

11. Representative Text Materials (With few exceptions, texts need to be current. Include publication dates.)


CSM Course Notebook

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