

College of San Mateo Course Outline

- New Course
 Update/No change
 Course Revision (Minor)
 Course Revision (Major)

Date: Feb. 14th, 2010

Department: Electronics Technology

Number: 441

Course Title: Sensors and Data Transmission Systems

Units: 4

Total Semester Hours

Lecture: 48

Lab: 48

Homework: 96

By Arrangement: 0

Length of Course

- Semester-long
 Short course (Number of weeks ___)
 Open entry/Open exit

Grading

- Letter
 Pass/No Pass
 Grade Option (letter or Pass/No Pass)

Faculty Load Credit (To be completed by Division Office; show calculations.):

48 hours of lecture/16 hours = 3 FLC lecture
(48 hours of lab/16 hours) x .7 = 2.1 FLC lab

Total FLC = 5.1

1. Prerequisite (Attach Enrollment Limitation Validation Form.)

Successful completion of ELEC 111 or equivalent course.

2. Corequisite (Attach Enrollment Limitation Validation Form.)

Successful completion of or concurrent enrollment in ELEC 112 or equivalent course.

3. Recommended Preparation (Attach Enrollment Validation Form.)

None

4. Catalog Description (Include prerequisites/corequisites/recommended preparation. For format, please see model course outline.)

441 Sensors and Data Transmission Systems (4) Minimum of 48 hours of lecture and 48 hours of lab per term. *Prerequisite: Successful completion of ELEC 111 or equivalent course.*

Corequisite: Successful completion of or concurrent enrollment in ELEC 112 or equivalent course. A practical course in industrial measurement of temperature, flow, pressure, and level focusing on their physical basis and fundamental laws. Application concepts in industrial instrumentation systems, sensor troubleshooting, and factors with influence sensor and system accuracy, performance, and calibration are described while stressing basic sensor theory of operation, faults, and calibration. (AA, CSU)

5. **Class Schedule Description** (Include prerequisites/corequisites/recommended preparation. For format, please see model course outline.)

ELEC 441 Sensors and Data Transmission Systems

A practical course in industrial measurement of temperature, flow, pressure, and level focusing on their physical basis and fundamental laws. Application concepts in industrial instrumentation systems, sensor troubleshooting, and factors with influence sensor and system accuracy, performance, and calibration are described while stressing basic sensor theory of operation, faults, and calibration. Prerequisite: Successful completion of ELEC 111 or equivalent course. Corequisite: Successful completion of or concurrent enrollment in ELEC 112 or equivalent course. (AA, CSU)

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. describe the basic concepts of temperature;
2. identify typical temperature sensors and describe their operation;
3. perform the calibration of and describe how to troubleshoot various temperature sensors;
4. describe the basic concepts of pressure;
5. identify typical pressure sensors and describe their operation;
6. perform the calibration of and describe how to troubleshoot various pressure sensors;
7. describe the basic concepts of flow;
8. identify typical flow sensors and describe their operation;
9. perform the calibration of and describe how to troubleshoot various flow sensors;
10. describe the basic concepts of level;
11. identify typical level sensors and describe their operation;
12. perform the calibration of and describe how to troubleshoot various level sensors;
13. describe various feedback and control modes;
14. identify instrumentation symbols and diagrams;
15. describe mechanical and electrical connections to industry standard;
16. identify instrument errors;
17. describe the concept of data transmission;
18. identify typical data transmitters and describe their operation;
19. perform the calibration of and describe how to troubleshoot various data transmitters

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. In this case, "Same as Student Learning Outcomes" is appropriate here.*)

Same as SLOs 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, a sample course syllabus with timeline may be attached.)

1. Pressure measurement
2. level measurement
3. flow measurement
4. temperature measurement
5. weight measurement
6. principles of calibration
7. calibrating pressure and temperature instruments

8. Calibrating flow and level instruments
9. feedback control
10. process control modes
11. process characteristics
12. process variables
13. instrumentation symbols
14. instrument loop diagrams
15. process and instrumentation diagrams
16. mechanical connections
17. electrical connections
18. primary calibration standards
19. pneumatic test equipment
20. electronics test equipment
21. instrument errors
22. instrument calibration

9. **Representative Instructional Methods** (Describe instructor-initiated teaching strategies that will assist students in meeting course objectives. Describe out-of-class assignments, required reading and writing assignments, and methods for teaching critical thinking skills. **If hours by arrangement are required, please indicate the additional instructional activity which will be provided during these hours, where the activity will take place, and how the activity will be supervised.**)

1. Lectures
2. Analytical problem sets
3. Essay question sheets
4. Topic reading assignments
5. Assigned computer simulation activities
6. System construction and troubleshooting 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.)

Kirk, Weedon, and Kirk. Instrumentation, 5th Edition. ATP, 2010.
Kirk. Instrumentation Workbook, 5th Edition. ATP, 2010.

Prepared by:

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Submission Date: _____