College of San Mateo
Course Outline

[New Course]
[Update/No change]
[Course Revision (Minor)]
[Course Revision (Major)]

Date: 11/10/11

Department: ELEC
Number: 445
Course Title: Industrial Data Communication
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.):
Lecture: 48/16 = 3 FLCs; Lab: 48/16*.7 = 2.1 FLCs total = 5.1 FLCs

1. **Prerequisite** (Attach Enrollment Limitation Validation Form.) ELEC 112 with a grade of C or better.

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

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

4. **Catalog Description** (Include prerequisites/corequisites/recommended preparation. For format, please see model course outline.)
   ELEC 445 Industrial Data Communication (4) Minimum of 48 lecture and 48 lab hours per term. Prerequisite: ELEC 112 with a grade of C or higher. A practical course in industrial data communication starting from the basics, this course demonstrates how to design and maintain industrial communications systems in an industrial production environment.

5. **Class Schedule Description** (Include prerequisites/corequisites/recommended preparation.)
   See catalog description
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. Demonstrate the use of traditional and current serial standards as required in an industrial plant environment.
2. Demonstrate a working programmable logic controller network in a simulated industrial automated application.
3. Describe and define different Ethernet varieties with design methods that utilize LANs.
4. Describe current wireless systems for industrial automation.
5. Identify the security needs of the IT department.
6. Identify and solve wireless technology problems in a real industrial automated application.

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 Student Learning Outcomes

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.)

The course covers the standards and techniques needed to design and maintain a communications system in an industrial production environment such as listed in the following:

- Data Communications
- Electronic data communications and automated process control
- Data Communication Terminology
- Serial Communications Standards
- Data Link Layer Basics and Data Encoding
- ISO/OSI Reference Model
- LAN Technologies to automate process control
- Ethernet Technology, Cabling and Configuration Rules
- Repeaters, Bridges, Routers, and Gateways
- TCP/IP
- Error detection and correction schemes
- Ethernet Readiness for an industrial environment
- Industrial Ethernet Design Techniques
- PLC software systems
- PLC Networks in an automated industrial setting
- Industrial Networks and Fieldbuses
- Wireless communication systems
- The Five Rules for Troubleshooting industrial data communication networks
• Troubleshooting with Statistics

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.**)

   a. Lectures
   b. Handouts
   c. Homework assignments
   d. On-line research
   e. Computer based training activities
   f. Lab activities
   g. Internet videos

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.)

   a. Quizzes (retention check of lecture and reading assignments)
   b. Tests (critical thinking skill set on blocks of information)
   c. Examinations (mid-term, final – retention and critical think evaluation)
   d. Homework assignments (reading and writing assignments with problem solving emphasis)
   e. Lab experiments (hands on skill set and critical problem solving evaluated)
   f. Lab practical (theory application with critical thinking and hands on problem solving evaluated)

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


    CSM, ELEC 445 Laboratory Manual with supplemental handouts

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               (Signature)

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