Electrical Engineering 3340: Controllers for Factory Automation
Prior Number - Electrical Engineering 235

Credit and Contact Hours
2 credit hours lecture and 1 credit hour laboratory (Two 50-minute sessions per week and one 110-minute laboratory session per week are typical).

Instructor
K. T. Erickson, Ph.D.

Text(s)

Course Information

Course Description
Introduction to programmable automation, programmable logic controller (PLC) hardware, programming languages and techniques, closed-loop strategies using PLC’s, sensors, transducers. Case studies. Laboratory experiments.

Prerequisites
Electrical Engineering 2120 (153) and Computer Engineering 2210 (111) with a grade of “C” of better; Passing the Electrical Engineering Advancement Exam II and the Computer Engineering Advancement Exam.

Required or Elective
Elective for electrical engineering majors

Course Goals

General Outcomes
1. Learn to program in ladder logic
2. Learn how to attack a sequential control problem
3. Get hands-on experience programming PLCs (Logix5550, PLC-5, Momentum) in a small team environment
4. Learn simple PID controller tuning techniques
5. Introduce measurement transducers and actuators
6. Introduce manufacturing safety concepts
### Relationship of Course to Program Outcomes

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<thead>
<tr>
<th>ECE Outcome</th>
<th>Course Outcomes</th>
<th>Comments</th>
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<tbody>
<tr>
<td>a</td>
<td>M S S</td>
<td>Emphasis on modern control engineering practice</td>
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<td>b</td>
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<tr>
<td>c</td>
<td>S S S S M S</td>
<td>Teaming in lab; mechanical and chemical applications</td>
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<tr>
<td>d</td>
<td>S S S W M M</td>
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<tr>
<td>e</td>
<td>S S S</td>
<td>Safety and human factors</td>
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<td>f</td>
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<td>g</td>
<td>M M</td>
<td>Lab reports</td>
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<tr>
<td>h</td>
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<td>Safety factors</td>
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<tr>
<td>i</td>
<td>M M</td>
<td>Working with multiple PLC vendors motivates the need for lifelong learning</td>
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S – strong connection; M – medium connection; W – weak connection

### Topics Covered
1. Basic ladder logic, discrete wiring (1-1/4 weeks)
2. PLC memory, timers, counters, troubleshooting (1-3/4 weeks)
3. Sequential applications (3 weeks)
4. Analog I/O, comparison, arithmetic instructions (2-1/2 weeks)
5. Standard code, parallel operations, SFC language (1 weeks)
6. Closed-loop control and PID controller tuning (3 weeks)
7. Sensors, transducers, communications, choosing PLC (1-1/2 weeks)
8. Tour of local factory and speakers from industry (1 week)
9. Exams (1-1/2 weeks plus a 2-hour final)