1. **Title:** Industrial Automation and Process Control

2. **Submitting College:** COST

3. **Department(s) Generating the Proposal:** Engineering Technology and Mathematics

4. **Effective Date:** Fall 2011

5. **Brief Summary of Proposal:**
The purpose of this course is to introduce students to Industrial Automation and Process Control. Students will explore Programmable Logic Controllers, Sensors, Robotics, Process Control and Computer Numerical Control Machines – all which are fundamental to the understanding of Industrial Automation and Process Control.

6. **Type of Proposal:** New course

7. **Graduate School Endorsement Status:** N/A

8. **Impact in Library Holdings:** none

9. **Impact on Existing Programs:** none

10. **Additional Resources Required:** none

11. **Approvals:**
    This change was approved by: 
    
    _______  Department of Engineering Technology  
    
    _______  College of Science & Technology  
    
    _______  Curriculum & New Programs Committee  
    
    _______  SSU Faculty Senate  
    
    X  Department of Engineering Technology  
    11/17/10
FORM II - COURSE ADDITION FORM FOR PROPOSAL # COST 2010-ELET 4612K

A. Course Number: ELET 4612K

B. Course Title: Industrial Automation and Process Control

C. Catalog Description: The purpose of this course is to introduce students to Industrial Automation and Process Control.

D. Rationale: Industrial automation and process control has wide application in industry.

E. Impact on Library Holdings:
   - Existing:
   - Additions:
   - Deletions:

F. Credit Hours: 3 Credit Hours

G. Prerequisites: Mechatronics ICET 3302, PLC ELET 4101K, Process Control ICET 205 and ICET 206 SCADA

H. Syllabus: Copy attached

I. Similarity to, or Duplication of, Existing Courses: N/A


K. Grading (letter grade, pass/fail, S/U etc.): A - F

L. Bibliography:
Name and Title: Asad Yousuf, Electronics Engineering Technology

Location: Lecture- Hubert A-118; Lab – Hubert A-113

Meeting Times:

Office Location/Office Hours:  
Hubert A-117; Monday - Thursday 11:40 – 12:40 and 1:00 – 3:00PM; other times by appointment

Office Telephone/E-mail:  
(912)351-6490; yousufa@savannahstate.edu

Course Description:  
The purpose of this course is to introduce students to Industrial Automation and Process Control. The course will provide comprehensive and accessible coverage of the evolving field of mechatronics for electrical engineering technology students. Students will explore Programmable Logic Controllers, Sensors, Robotics, Process Control and Computer Numerical Control Machines – all which are fundamental to the understanding of Industrial Automation and Process Control.

Credit Hours:  
3 credit hours

Prerequisites:  
Mechatronics ICET 3302, Programmable Logic Controllers ELET 4101K, Process Control ICET205, SCADA ICET 206

Course Objectives:  
The objectives of this course are:

- Gain a understanding of basic industrial automation.
- Learn how to understand and apply programmable logic controllers.
- Learn the basics of sensors.
- Learn how to program and interface programmable logic controllers
- Learn the theoretical and practical aspects of robotics.
- Learn the basics of process control system theory, design, and application.
- Become proficient with using laboratory instrumentation.
- Gain experience designing and constructing basic PLC and Control Systems.

Expected Student Learning Outcomes:  
As an indication of successful culmination of this course, the student should be able to:

Upon completion of the Industrial Automation and Process Control course, a student should be able to:

1. Gain a solid grasp on the fundamentals aspects of industrial automation technology.
2. Design and analyze issues in programmable logic controllers using sensors, electronics, and computer hardware and software.
3. Understand the mechanism and applications of process control design methods.
4. Install troubleshoot and maintain the process control systems.
Core Competencies:
ELET 3xxx addresses the following core competencies which are measured by the methods listed below the competency.

1\textsuperscript{st} Core Competency: \textbf{Reading}
Measured by: General success in class

2\textsuperscript{nd} Core Competency: \textbf{Writing}
Measured by: Success in writing lab reports

3\textsuperscript{rd} Core Competency: \textbf{Mathematics}
Measured by: Performance on course examinations and homework assignments which require the use of basic algebra

4\textsuperscript{th} Core Competency: \textbf{Critical Thinking}
Measured by: Performance on lab reports which require analysis and evaluation of data and procedures

5\textsuperscript{th} Core Competency: \textbf{Technology}
Measured by: Performance on portion of course examinations, generation of lab reports and charts using Electronic Workbench, Altera and MSWord

Required Text and Supplemental Readings:

Software: Electronic Workbench, RSLogix500, and MSWORD.

Course Requirements and Methods of Assessment:
1. Each student is required to read all daily assignments and participate in class discussions.
2. Each student is required to complete and turn in all home assignments including the final project on time.
3. The final grade for each student represents his/her success in all of the instructional areas of this course:

   3-Unit Tests:
   - Test # 1: 20%
   - Test # 2: 20%
   - Test # 3: 20%
   - Home Assignments and Labs: 20%
   - Final Examination: 20%

   Total: 100%

Examinations must be taken at the assigned time. There will be no make-up exams given unless one has an officially excused absence. This excuse must be recorded within 24 hours after student returns.

Methods of Instruction:
Lecture, hands-on laboratory exercises, problem solving sessions, and discussion are the primary means of instructing students in this course. Students are encouraged to record the lecture and save them on iPod.

Laboratory:
1. The students will be divided into teams. Each team is required to identify a team leader. Leadership can alternate throughout the semester. Teams will alternate their responsibilities of getting all equipments set and ready for the designated assignment as well as cleaning the lab after the assignment is completed.
2. Upon the completion of the laboratory exercise, students are required to submit a written report in accordance with the handouts presented for that lab. The lab report is due the following week unless prior arrangement is made.

3. The lab hours will be utilized for:
   **Hands-on laboratory exercises**
   - Introduction to safe use of Lab Equipment
   - Introduction to Rockwell Automation Addressing and instructions
   - Timers and Counters
   - Industrial sensors
   - Application of Robotics
   - Process Control using LabView Table top trainer
   - Input/Output modules wiring

**Grading Policy:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90 – 100</td>
</tr>
<tr>
<td>B</td>
<td>80 – 89</td>
</tr>
<tr>
<td>C</td>
<td>70 - 79</td>
</tr>
<tr>
<td>D</td>
<td>60 – 69</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 59</td>
</tr>
</tbody>
</table>

**Class and Lab Attendance Policy:**

**SSU Policy:**
Savannah State University endeavors to provide optimum conditions for student learning. Class attendance is, therefore, required of students to ensure that they will be exposed to the many classes, laboratories, and related experiences provided for their benefit. Extenuating circumstances may at times make it difficult for students to attend every class meeting. Students who are unable to attend a class should notify the professor in a timely manner and arrange the conditions under which any required work may be made up. Credit may or may not be awarded for any course if the number of absences exceeds the number of times that the class meets per week. Students who exceed the allowed number of absences in any course may receive a grade of “F” or be administratively withdrawn. Students who are withdrawn at or before mid-semester will receive a grade of “W”; students withdrawn after mid-semester will receive a grade of “WF”

**Instructor Policy:**
1. Attendance is mandatory. Each student is required to be on time. **Any student who is absent for more than 5-hours during the semester will be given an “F” grade.**
2. Students cannot miss any lab. In case of an extreme emergency an excused absence can be granted to the student. However, it is the responsibility of the student to get in touch with the team members in order to redo the lab. The missing lab and lab report must be completed within a week.

**Academic Honesty Policy:**
Academic honesty will be enforced according to the policy in the handbook. Refer to Student Affairs: Academic Irregularity

**Statement on Disabilities:**
If a student has a documented and or declared disability, reasonable accommodations will be provided if requested by the student according to the recommendations of the office of Counseling and Disability Services (CDS): (912) 356-2285 / (912) 303-1650 / (912) 356-2202
**Course Schedule:**

**Course Matrix**

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Lecture Topics</th>
<th>Reading</th>
<th>Homework</th>
<th>Labs Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1, Week 2</td>
<td>Overview of Industrial Automation Safety</td>
<td>Chapter 1</td>
<td>Chapter 1 &amp; 2 Problems</td>
<td>No Labs this week</td>
</tr>
<tr>
<td>Week 3, Week 4</td>
<td>Overview of Programming Logic Controllers Fundamentals of Programming</td>
<td>Chapter 3 &amp; 4</td>
<td>Chapter 3 &amp; 4 Problems</td>
<td>Lab 1, Lab 2, Test 1</td>
</tr>
<tr>
<td>Week 5, Week 6</td>
<td>Rockwell Automation Addressing and Instructions, Timer and Counters</td>
<td>Chapter 5, Chapter 6</td>
<td>Chapter 5 &amp; 6 Problems</td>
<td>Lab 3, Lab 4</td>
</tr>
<tr>
<td>Week 7, Week 8, Week 9</td>
<td>Input/output Modules and Wiring Arithmetic and Advanced Instructions Industrial Sensors</td>
<td>Chapter 7, Chapter 8, Chapter 9</td>
<td>Chapter 7, 8 &amp; 9 Problems</td>
<td>Lab 5, Test 2</td>
</tr>
<tr>
<td>Week 10, Week 11</td>
<td>Introduction to Robotics Introduction to Fluid Power Actuation</td>
<td>Chapter 10</td>
<td>Chapters 10 &amp; 11 Problems, Chapter 9 Problems</td>
<td>Lab 6</td>
</tr>
<tr>
<td>Week 12, Week 13</td>
<td>Fundamentals of Process Control Process Control Systems</td>
<td>Chapter 12 &amp; 13</td>
<td>Chapter 12 &amp; 13 Problems</td>
<td>Lab 7, Test 3</td>
</tr>
<tr>
<td>Week 14, Week 15</td>
<td>Computer Numerical Control (CNC) Installation, Maintenance, and Troubleshooting</td>
<td>Chapter 15 &amp; 16</td>
<td>Chapter 15 &amp; 16 Problems</td>
<td></td>
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<tr>
<td>Week 16</td>
<td>Review</td>
<td>All Chapters</td>
<td>All Chapter Problems</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

*All dates are tentative and may be changed*