1. **Title:** Instrumentation and Measurement

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 Instrumentation and Measurement. The course will provide comprehensive and applied coverage of instrumentation and measurement. Students will explore Measurement Systems, Signal Conditioning, Noise, AC/DC Null Measurements, Application of Sensors, Basic Electrical Measurements, and examples of design of measurement systems - all which are fundamental to the understanding of Instrumentation and Measurements.

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: 

<table>
<thead>
<tr>
<th>Name of Approval</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>X Department of Engineering Technology</td>
<td>11/17/10</td>
</tr>
<tr>
<td>College of Science &amp; Technology</td>
<td></td>
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<tr>
<td>Curriculum &amp; New Programs Committee</td>
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<td>SSU Faculty Senate</td>
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</tbody>
</table>
FORM II - COURSE ADDITION FORM FOR PROPOSAL # COST 2010-ELET 4412K

A. Course Number: ELET 4412K

B. Course Title: Instrumentation and Measurement

C. Catalog Description: The purpose of this course is to provide students with basic understanding of instrumentation, sensors, analog and digital signal conditioning. Students will gain experience in designing basic measurement systems and will become proficient in using laboratory based instrumentation and measurement devices.

D. Rationale: Mechatronics plays an important role in manufacturing of engineering products.

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

F. Credit Hours: 3 Credit Hours

G. Prerequisites: ICET 204 Measurements and Process Control

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 Instrumentation and Measurement. The course will provide comprehensive and applied coverage of instrumentation and measurement. Students will explore Measurement Systems, Signal Conditioning, Noise, AC/DC Null Measurements, Application of Sensors, Basic Electrical Measurements, and examples of design of measurement systems- all which are fundamental to the understanding of Instrumentation and Measurements.

Credit Hours: 3 credit hours

Prerequisites: Measurement and Process Control ICET 204

Course Objectives: The objectives of this course are:

- Gain a understanding of basic instrumentation.
- Learn about Analog and Digital signal conditioning.
- Learn the basics of sensors.
- Become proficient with using laboratory instrumentation.
- Gain experience designing basic measurement 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 instrumentation and measurement.
2. Design and analyze issues in measurement using sensors, electronics, and computer hardware and software.
3. Understand the mechanism and applications of measurement systems.
4. Install troubleshoot and maintain the measurement systems.
Core Competencies:
ELET 3xxx addresses the following core competencies which are measured by the methods listed below the competency.

1st Core Competency: Reading
Measured by: General success in class

2nd Core Competency: Writing
Measured by: Success in writing lab reports

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

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

5th Core Competency: 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:
Required Text: The primary textbook for this course is “Introduction to Instrumentation and Measurement” by Robert B. Northrop, ISBN:0-8493-7898-2

Software: Excel 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
- Analog/Digital Signal Conditioning
- DC/AC measurements
- Application of sensors
- Input/Output modules wiring

**Grading Policy:**
A 90 – 100
B 80 – 89
C 70 - 79
D 60 – 69
F < 59

**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>
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</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Measurement Systems</td>
<td>Chapter 1</td>
<td>Chapter 1 &amp; 2 Problems</td>
<td>No Labs this week</td>
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<tr>
<td>Week 2</td>
<td></td>
<td>Chapter 2</td>
<td></td>
<td></td>
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<tr>
<td>Week 3</td>
<td>Analog Signal Conditioning</td>
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<tr>
<td>Week 4</td>
<td>Noise and Coherence Interference in Measurement</td>
<td>Chapter 3</td>
<td>Chapter 3 Problems</td>
<td>Test 1</td>
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<tr>
<td>Week 5</td>
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<tr>
<td>Week 6</td>
<td>DC/AC Null Measurements</td>
<td>Chapter 4</td>
<td>Chapter 4 &amp; 5 Problems</td>
<td>Lab 1</td>
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<td>Week 7</td>
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<td>Chapter 5</td>
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<tr>
<td>Week 8</td>
<td>Survey of Sensor Mechanism</td>
<td>Chapter 6</td>
<td>Chapter 6 Problems</td>
<td>Lab 2 Test 2</td>
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<td>Week 9</td>
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<tr>
<td>Week 10</td>
<td>Application of Sensors to Physical Measurements</td>
<td>Chapter 7</td>
<td>Chapter 7 Problems</td>
<td>Lab 3</td>
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<td>Week 11</td>
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<tr>
<td>Week 12</td>
<td>Basic Electrical Measurements</td>
<td>Chapter 8 &amp; 9</td>
<td>Chapter 8 &amp; 9 Problems</td>
<td>Lab 4 Test 3</td>
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<tr>
<td>Week 13</td>
<td>Digital Interface in measurement systems</td>
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<td>Week 14</td>
<td>Examples of the Design of Measurement Systems</td>
<td>Chapter 10</td>
<td>Chapter 10 Problems</td>
<td>Lab 5</td>
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<td>Week 15</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>
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</tbody>
</table>

*All dates are tentative and may be changed*