PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

DATA ACQUISITION & CONTROL
EET 2910

Class Hours: 0.0 Credit Hours: 2.0
Laboratory Hours: 4.0 Revised: Spring 05

Catalog Course Description:

LabVIEW will be emphasized in solving problems in instrumentation and control. This course covers basic data acquisition and control techniques.

Entry Level Standards:

The student needs a basic knowledge of digital and analog electronics, along with a knowledge of Windows.

Prerequisites:

EET 1210 and EET 2310

Textbook(s) and Other Course Materials:

Learning with LabView with Software, Bishop, Addison Wesley.

I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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</thead>
</table>
| 1    | Lecture: Transducers, sensors, and actuators  
      | Lab: Introduction to LabVIEW |
| 2    | Lecture: Signal conditioning  
      | Lab: Editing Techniques |
| 3    | Lecture: Introduction to LabVIEW creating a VI  
      | Lab: Building a VI |
| 4    | Lecture: LabVIEW programming techniques  
      | Lab: VI's and sub VI's |
| 5    | Lecture: The For Loop  
      | Lab: The For Loop |
| 6    | Lecture: The While Loop  
      | Lab: The While Loop |
| 7    | Lecture: Shift Registers  
      | Lab: Arrays |
| 8    | Lecture: Global and Local variables |
Lab: Arrays and Graphs

9 Lecture: Global and Local variables continued
Lab: Case Structure

10 Lecture: Strings
Lab: Sequence Structure

11 Lecture: Arrays
Lab: String Arrays

12 Lecture: Case and Sequence Structures
Lab: Data acquisition

13 Lecture: Clusters, Writing and Reading Files
Lab: Instrument control; Special Problem

14 Lecture: Data Acquisition; Instrument Control
Lab: Special problem

15 Lecture: Final Exam
Lab: Final Exam

II. Course Objectives*:

A. Have a basic understanding of transducers, sensors and actuators. A, B, D, E
B. Understand basic signal conditioning theory. A, B, D, E
C. Be able to create Virtual Instruments (VI's) using LabView for Windows. A, B, D, E
D. Create programs which use the For Loop and the While Loop. A, B, D, E
E. Understand the use of Global and Local variables. A, B, D, E
F. Create programs using strings arrays. A, B, D, E
G. Understand how Case and Sequence structures are used. A, B, D, E
H. Acquire and display real data. A, B, D, E
I. Control real instruments. A, B, D, E
J. Demonstrate, as an individual and as a team member, library/information skills, time management skills, problem-solving skills, material management skills, and communication skills. D, F, G, I, K

*Letters after course objectives reference EET Program Outcomes (as required by ABET).

III. Instructional Processes*:

Students will:

1. Participate in classroom discussions which challenge their abilities to think creatively and visualize complex spatial and mathematical relationships to solve problems. Mathematics Outcome
2. Work in teams to conduct laboratory experiments and also to solve special problem assignments. These activities are designed to foster interpersonal skills in teamwork and develop and enhance leadership skills, students' abilities to express ideas, and students' abilities to reach consensus solutions for the team through negotiation. *Active Learning Strategy, Communication Outcome, Mathematics Outcome*

3. Use electronic test equipment to test electrical circuits constructed from schematics in the laboratory and acquire data. Use computers with applications software to simulate, analyze, and predict the behavior of electrical circuits. Compare expected responses to experimental responses of electrical circuits. Use the Internet for special assignments such as locating data sheets on electronic components. Use computers with word processing software to prepare reports. *Technological Literacy Outcome, Mathematics Outcome, Numerical Literacy Outcome*

4. Prepare reports on laboratory experiments which include methodology, mathematical analyses of electrical circuit models, a comprehensive comparison of calculated results with experimental results, and conclusions. *Communication Outcome, Mathematics Outcome, Technological Literacy Outcome*

5. Discuss the importance of personal qualities such as personal responsibility, time management principles, self-esteem, sociability, self-management, integrity and honesty in school and in the workplace, and dynamics of change in the workplace. *Social and Behavioral Science Outcome, Transitional Strategy*

*Strategies and outcomes listed after instructional processes reference TBR’s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.*

**IV. Expectations for Student Performance***:

Upon successful completion of this course, the student should be able to:

1. Understand the capabilities of various sensors and transducers. A
2. Understand actuators and their part in control systems. A
3. Understand the requirements of signal conditioning. B
4. Understand the necessity for shielding and grounding. B
5. Explain basic sampling theory. B
6. Explain what is meant by a virtual instrument (VI). C
7. Use LabVIEW editing techniques. C
8. Create, save and open a VI. C
9. Understand how to use a While Loop. D
10. Display data in waveform charts. D
11. Understand how to use a for Loop. D
12. Use shift register. D
13. Generate arrays. E
14. Create multiple plot graphs. E
15. Understand what is meant by Polymorphism. E
16. Use the Bundle and Cluster functions. E
17. Create string controls and indicators. F
18. Understand file I/O operations. F
19. Use the Case Structure. G
20. Use the Sequence Structure. G
21. Write a data acquisition program to acquire data from a real system using VXI instruments. H
22. Analyze and display data in a real system. H
23. Write a program to control instruments used to test a real system. I
24. Design a test set up for a given problem. I

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures: 25% of grade
   A student’s grade is based on tests and laboratory activities.

B. Laboratory Expectations: 75% of grade
   A student’s grade is based on tests and laboratory activities.

C. Field Work:
   N/A

D. Other Evaluation Methods:
   N/A

E. Grading Scale:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93 - 100</td>
<td>A</td>
</tr>
<tr>
<td>88 - 92</td>
<td>B+</td>
</tr>
<tr>
<td>85 - 92</td>
<td>B</td>
</tr>
<tr>
<td>78 - 82</td>
<td>C+</td>
</tr>
<tr>
<td>70 - 77</td>
<td>C</td>
</tr>
<tr>
<td>60 - 69</td>
<td>D</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
</tr>
</tbody>
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VI. Policies:

A. Attendance Policy:
Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course (Pellissippi State Catalog). Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.

Attendance is required to all lab sessions unless excused by the instructor. Students missing more than four unexcused sessions will receive an "F" and no credit will be received. Students tardy past half an hour will be considered absent.

B. Academic Dishonesty:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices: Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments. In addition to other possible disciplinary sanctions that may be imposed as a result of academic misconduct, the instructor has the authority to assign either (1) an F or zero for the assignment or (2) an F for the course.

C. Accommodations for disabilities:

If you need accommodation because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Privately after class or in the instructor's office.

To request accommodations students must register with Services for Students with Disabilities: Goins 127 or 131, Phone: (865) 539-7153 or (865) 694-6751 Voice/TDD.