

PELLISSIPPI STATE COMMUNITY COLLEGE  
MASTER SYLLABUS

**DATA ACQUISITION & CONTROL**  
**EET 2910**

**Class Hours: 1**  
**Laboratory Hours: 3**

**Credit Hours: 2**  
**Date Revised: Fall 2016**

**Catalog Course Description**

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

**Prerequisites**

EET 1012 or Consent of Instructor

**Corequisites**

None

**Textbook(s) and Other Course Materials**

LabVIEW for Everyone, Travis & Kring, Prentice Hall, latest edition.  
National Instruments Student Version of LabVIEW software, latest Edition.

**Week/Unit/Topic Basis**

**Week Topic**

1	Transducers, sensors, and actuators
2	Signal conditioning
3	Data Acquisition; Instrument Control Introduction to LabVIEW creating a VI
4	LabVIEW Programming Techniques
5	Introduction to Class Project: I/O List, P&ID, I/O Configuration
6	Class Project: Create Front Panel
7	The For Loop
8	The While Loop
9	Shift Registers and Timing Functions
10	Case and Sequence Structures
11	Global and Local variables
12	Strings
13	Arrays
14	Clusters, Writing and Reading Files
15	FINAL EXAM

**Engineering Technology General Outcomes (Educational objectives)**

- I. Apply basic engineering theories and concepts creatively to analyze and solve technical problems

- II. Utilize with a high degree of knowledge and skill equipment, instruments, software, and technical reference materials currently used in industry.
- III. Communicate effectively using developed writing, speaking, and graphics skills.
- IV. Assimilate and practice the concepts and principles of working in a team environment.
- V. Obtain employment within the discipline or matriculate to a four year program in engineering or industrial technology

### **Engineering Technology Concentration Competencies\***

NOTE: At the program level all 6 competencies apply to roman numerals I – V of the Engineering Technology General Outcomes (Educational objectives) listed above.

Students will

- A. Apply the knowledge, techniques, skills, and modern tools for the concentration of study to specifically defined engineering technology activities
- B. Demonstrate the knowledge of mathematics, science, engineering and technology to engineering technology problems using developed practical knowledge
- C. Conduct and report the results of standard tests and measurements, and conduct, analyze and interpret experiment or project results
- D. Function effectively as a member of a technical team
- E. Identify, analyze and solve specifically defined engineering technology-based problems
- F. Employ Written, oral and visual communication in a technical environment

### **Course Goals**

NOTE: Capital letters after course goals reference the competencies of the Engineering Technology concentrations listed above.

The course will

- 1 Enhance student understanding of transducers, sensors and actuators. (A, B, C, E)
- 2 Enhance student understanding of basic signal conditioning theory. (A, B, C, E)
- 3 Develop student knowledge in creating Virtual Instruments (VI's) using LabVIEW. (A, B, C, E, F)
- 4 Expand student ability to write programs which use the For Loop and the While Loop. (A, B, C, E, F)
- 5 Enhance student understanding in the use of Local variables and I/O file management. (A, B, C, E, F)
- 6 Expand student ability to create programs using strings arrays. (A, B, C, E, F)
- 7 Expand student knowledge of Case and Sequence structure applications in LabVIEW VI(s). (A, B, C, E, F)
- 8 Improve student knowledge and understanding of methods to acquire and display real data using LabVIEW. (A, B, C, E, F)
- 9 Expand student ability to control real field instruments using LabVIEW. (A, B, C, E, F)
- 10 Enhance student ability to work on projects as an individual and as a team member, research the web and develop information access skills, develop time management skills, apply problem-solving skills, and apply communication skills. (D, F)

## Expected Student Learning Outcomes

NOTE: Numbers after Expected Student Learning Outcomes reference the course goals listed above.

The student will

- a. Understand the capabilities of various sensors and transducers. (1)
- b. Understand actuators and their part in control systems. (1)
- c. Understand the requirements of signal conditioning. (2)
- d. Understand the necessity for shielding and grounding. (2)
- e. Explain basic sampling theory. (2)
- f. Explain what is meant by a virtual instrument (VI). (3)
- g. Use LabVIEW editing techniques. (3)
- h. Create, save and open a VI. (3)
- i. Understand how to use a While Loop. (4)
- j. Display data in waveform charts. (4)
- k. Understand how to use a For Loop. (4)
- l. Use shift register. (4)
- m. Generate arrays. (5)
- n. Create multiple plot graphs. (5)
- o. Use the Bundle and Cluster functions. (5)
- p. Create string controls and indicators. (6)
- q. Understand file I/O operations. (5)
- r. Use the Case Structure. (7)
- s. Use the Sequence Structure. (7)
- t. Write a data acquisition program to acquire data from a real system using VI instruments. (8, 10)
- u. (8, 10)
- v. Analyze and display data in a real system. (8, 10)
- w. Write a program to control instruments used to test a real system. (8, 9, 10)

## Evaluation

### Testing Procedures: 60% of grade

Chapter Tests	40%
Quizzes/Homework	20%

### Laboratory Expectations: 20% of grade

The laboratories for all EET courses are an essential part of conveying the concepts to the student. The labs would closely follow the classes in content and in time of presentation so that the student is actually verifying these concepts to his or her self. The student will be able to apply the theory learned in class. The laboratory grade will be determined by a combination of performance within the lab and the quality and demonstrated comprehension of the lab report. There will be at least twelve labs during the semester to go along with the classroom material.

**Field Work: None**

**Other Evaluation Methods: (20% of grade)**

- Individual Capstone Project
- i. Title page (Name, Project Title, Course Number, Date)
  - ii. Project Description (5pts)
  - iii. P&ID (10pts)
  - iv. I/O List (5pts)
  - v. Front Panel Screen(s) (25pts) [Clean, Neatness, Color Scheme, Organization, Readable]
  - vi. Block Diagram (25pts) [Clean, Organized, Documented, Complexity]
  - vii. Working Program (30pts)

**Grading Scale**

93 – 100	A
88 - 92	B+
83 - 87	B
78 - 82	C+
70 – 77	C
60 - 69	D
0 - 59	F

**Policies**

**Attendance Policy**

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic Affairs, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of Academic Affairs.

**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.

- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

Please see the Pellissippi State Policies and Procedures Manual, Policy 04:02:00 Academic/Classroom Conduct and Disciplinary Sanctions for the complete policy.

### **Accommodations for Disabilities**

Students that need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Disability Services (DS) in order to receive accommodations in this course.

[Disability Services](http://www.pstcc.edu/sswd/) (<http://www.pstcc.edu/sswd/>) may be contacted via [Disability Services email](#) or by visiting Alexander 130.