



Course Number and Title: ELC 283 Introduction to LabVIEW

Campus Location:

Georgetown, Dover, Stanton

Effective Date:

2020-51

Prerequisite:

ELC 126, ELC 227

Co-Requisites:

none

Course Credits and Hours:

3.00 credits

2.00 lecture hours/week

2.00 lab hours/week

Course Description:

This course introduces LabVIEW instrumentation software that uses graphical programming language to write programs and analyze predefined electronic circuits.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

USB flash drive, notebook, calculator, and LabVIEW student version software.

Schedule Type:

Classroom Course

Hybrid Course

Online Course

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Describe virtual instruments (VIs), and explain how they are used in programming the front panel and block diagram of LabVIEW software. (CCC 1, 2, 5; PGC EEN 1; ETT 1)
2. Develop VIs, including computations, labeling objects, routing wires, finding errors with break points, and probes. (CCC 1, 2, 5; PGC EEN 1, 2, 4; ETT 1,2,4)
3. Develop subVI programs, including automatic error handling, manual error handling, and error clusters. (CCC 1, 2, 5; PGC EEN 1, 2, 4; ETT 1,2,4)
4. Assess structures, including for loops, shift registers, feedback nodes, and formula nodes. (CCC 1, 2, 5; PGC EEN 1, 2, 4; ETT 1,2,4)
5. Assess arrays and clusters, including array size, build array, index array, the bundle and unbundle function, and matrix functions. (CCC 1, 2, 5; PGC EEN 1, 2, 4; ETT 1,2,4)
6. Design, analyze, edit, and debug axes scaling, plot legends, and special chart/graph customization features, including two-dimensional (2D) and three-dimensional (3D) graphs. (CCC 1, 2, 5; PGC EEN 1, 2, 4; ETT 1,2,4)
7. Develop LabVIEW programs using string and file input/output (I/O). (CCC 1, 2, 5; PGC EEN 1, 2, 4; ETT 1,2,4)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Describe virtual instruments (VIs), and explain how they are used in programming the front panel and block diagram of LabVIEW software.
 1. Identify and describe the different types of indicators used on the front panel: numeric, Boolean, and configuring controls.
 2. Identify and describe in the block diagram VIs and express VIs, nodes, terminals, and wiring.
 3. Write and debug a simple program using basic controls on the front panel and block diagram.
2. Develop VIs, including computations, labeling objects, routing wires, finding errors with break points, and probes.
 1. Create controls and indicators on the block diagram, and label all functions accordingly.
 2. Explain the effects of wiring, routing, resizing, and cleaning up objects.
 3. Explain the techniques for finding errors, using breakpoints, highlighting, and single-stepping through VIs.
3. Develop sub-VI programs, including automatic error handling, manual error handling, and error clusters.
 1. Modify control and indicator terminal patterns to meet design specifications.
 2. Create a subVI from an existing VI.
 3. Debug errors using automatic error handling, manual error handling, and error clusters.
4. Assess structures, including for loops, shift registers, feedback nodes and formula nodes.
 1. Write and debug programs using for loops with condition terminals.
 2. Write and debug programs using shift registers and feedback nodes.
 3. Explain and edit local variables within the different types of structures.
 4. Explain common programming techniques, including sequential programming, state programming and state machines, and parallelism.
5. Assess arrays and clusters, including array size, build array, index array, the bundle and unbundle function, and matrix functions.
 1. Create array controls, indicators, and multidimensional arrays.
 2. Explain the different types of array functions, including array size, initialize array, build array, array subset, and index array.
 3. Create cluster controls, and explain their functions, including the bundle and unbundle functions, constants, and polymorphisms.
6. Design, analyze, edit, and debug axes scaling, plot legends, and special chart/graph customization features, including two-dimensional (2D) and three-dimensional (3D) graphs.
 1. Create custom charts and graphs using axes scaling, plot legends, and graph annotations.
 2. Create and explain math plots for 2D and 3D graphs.
 3. Write a program that includes charts and 2D and 3D graphs.
7. Develop programs using string and file input/output (I/O).
 1. Write programs using string and file I/O functions.
 2. Use express VIs to write programs that will display the information received from file I/Os.

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Final Course Grade:

Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
Summative: 4 Exams (Equally weighted)	70%
Formative: (10-15) Laboratory Experiments (Equally weighted)	30%
TOTAL	100%

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):
EENAASEEN

1. Perform the duties of an entry-level technician using the skills, modern tools, theory, and techniques of the electronics engineering technology.
2. Apply a knowledge of mathematics, science, engineering, and technology to electronics engineering technology problems that require limited application of principles but extensive practical knowledge.
3. Conduct, analyze, and interpret experiments using analysis tools and troubleshooting methods.
4. Identify, analyze, and solve narrowly defined electronics engineering technology problems.
5. Explain the importance of engaging in self-directed continuing professional development.
6. Demonstrate basic management, organizational, and leadership skills which commit to quality, timeliness, and continuous improvement.

EENAASETT

1. Apply circuit analysis and design, computer programming, associated software, analog and digital electronics, and microcomputers, and engineering standards to the building, testing, operation, and maintenance of electrical/electronic(s) systems.
2. Apply a knowledge of mathematics, science, engineering, and technology to electronics engineering technology problems.
3. Conduct, analyze, and interpret experiments using analysis tools and troubleshooting methods.
4. Identify, analyze, and solve electronics engineering technology problems.
5. Explain the importance of engaging in self-directed continuing professional development.
6. Demonstrate basic management, organizational, and leadership skills that commit to quality, timeliness, and continuous improvement.

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.