# 11/7/2020

# brcc keystone logo

Baton Rouge Community College

*Academic Affairs Master Syllabus*

Date Approved: 3 September 2020

Term and Year of Implementation: Spring 2021

**Course Title:** Instrumentation Level 3 Part 2

**BRCC Course Rubric:** INST 1326

**Previous Course Rubric**: INST 2333 and INST 2343

**Lecture Hours per week-Lab Hours per week-Credit Hours**: 2-8-6

**Per semester: Lecture Hours-Lab Hours-Instructional Contact Hours**: 30-120-150

**Louisiana Common Course Number:**

**CIP Code:** 15.0404

**Course Description:** Covers the National Center for Construction Education and Research (NCCER) Instrumentation Level 3 Modules 5 – 9. Successful completion of this course requires passing the NCCER Level 3 Modules 5 – 9 Exams with a 70% or higher. This course requires an exam fee.

**Prerequisites:**  INST 1316

**Co-requisites:** None

**Suggested Enrollment Cap:** 20

**Learning Outcomes.** *Upon successful completion of this course, the students will be able to:*

1. Describe the operation of various switches, photoelectric devices, infrared-sensing devices, fiber-optic devices, proximity sensors, and types of instrumentation cable and their related terminal hardware.

2. Demonstrate how to select and connect various switches and photoelectric devices into a functional circuit.

3. Demonstrate how to terminate various types of low-voltage cable and how to test and troubleshoot cable installations.

4. Describe process control and the basic components of the instrumentation control channel.

5. Describe open, closed, cascade, and ratio control loops, on-off and modulating control modes, and temperature-control, pressure-control, level-control, and flow-control applications.

**Assessment Measures.** Assessment of all learning outcomes will be measured using the following methods:

1. Practical demonstrations and skills performances

2. Quizzes and tests

3. NCCER Instrumentation Level 3 Modules 5 – 9 Exams

**Information to be included on the Instructor’s Course Syllabi:**

* ***Disability Statement*:** Baton Rouge Community College seeks to meet the needs of its students in many ways. See the Office of Disability Services to receive suggestions for disability statements that should be included in each syllabus.
* ***Grading:*** The College grading policy should be included in the course syllabus. Any special practices should also go here. This should include the instructor’s and/or the department’s policy for make-up work. For example in a speech course, “Speeches not given on due date will receive no grade higher than a sixty” or “Make-up work will not be accepted after the last day of class”.
* ***Attendance Policy*:** Include the overall attendance policy of the college. Instructors may want to add additional information in individual syllabi to meet the needs of their courses.
* ***General Policies*:** Instructors’ policy on the use of things such as beepers and cell phones and/or hand held programmable calculators should be covered in this section.
* ***Cheating and Plagiarism*:** This must be included in all syllabi and should include the penalties for incidents in a given class. Students should have a clear idea of what constitutes cheating in a given course.
* ***Safety Concerns:*** In some courses, this may be a major issue. For example, “No student will be allowed in the lab without safety glasses”. General statements such as, “Items that may be harmful to one’s self or others should not be brought to class”.
* ***Library/ Learning Resources:*** Since the development of the total person is part of our mission, assignments in the library and/or the Learning Resources Center should be included to assist students in enhancing skills and in using resources. Students should be encouraged to use the library for reading enjoyment as part of lifelong learning.

**Expanded Course Outline:**

I. Switches and Photoelectric Devices

A. Switches and Photoelectric Devices

a. Characteristics of witches

b. Switch types and styles

c. Switch applications

d. Photoelectric devices

e. Infrared-sensing devices

f. Fiber-optic sensors

g. Proximity sensors

II. Terminating Conductors

A. Instrumentation Cable and Their Related Terminal Hardware

a. Types of communication cable

b. Low-voltage connectors and terminals

B. Terminating Low-Voltage Cable

a. Terminating cables and conductors with solderless terminals or terminal blocks

b. Terminating coaxial cable

c. Considerations and installation techniques related to cable and conductor routing

d. Considerations and installation techniques related to avoiding electromagnetic interference

C. Testing and Troubleshooting Cable Installations

a. Common test equipment

b. Cable and conductor testing parameters used to determine condition

c. Cable and conductor troubleshooting techniques

d. Cable and conductor failures and their potential causes

III. Grounding and Shielding of Instrumentation Wiring

A. Grounding and Bonding Techniques

a. Grounding and bonding key terms

b. Basic grounding components and techniques

c. Bonding and its purpose

B. Electromagnetic Interference and Methods to Reduce or Eliminate its Influence

a. Capacitive-coupled noise

b. Inductive-coupled noise

c. Directly-coupled noise

d. Cable shielding and grounding techniques

IV. Process Control Theory

A. Process Control and Basic Components of the Instrumentation Control Channel

a. Characteristics of a process

b. Basic process control

c. Components of an instrumentation control channel

d. Types of final control elements

B. Process Control Loops

a. Open control loops

b. Closed control loops

c. Cascade control

d. Ratio control

C. Control Modes

a. On-off control modes

b. Modulating control modes

D. Control Applications and Their Basic Strategies

a. Temperature-control loops

b. Pressure-control loops

c. Level-control loops

d. Flow-control loops

V. Controllers

A. Pneumatic and Electronic Controllers

a. Controllers and their common operating modes

b. Basic and specific pneumatic controller configurations

c. Basic electronic controller configurations