# 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 2 Part 2

**BRCC Course Rubric:** INST 1226

**Previous Course Rubric**: INST 1233 and INST 1243

**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 2 Modules 7 – 11. Successful completion of this course requires passing the NCCER Level 2 Modules 7 – 11 Exams with a 70% or higher. This course requires lab and exam fees.

**Prerequisites:**  INST 1216

**Co-requisites:** None

**Suggested Enrollment Cap:** 20

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

1. Describe various types of conduits, fittings, and supports, as well as various raceways and their related fittings and supports.

2. Demonstrate how to prepare and assemble various types of conduits.

3. Describe the processes of cleaning, purging, and testing piping and tubing systems.

4. Describe the factors related to the layout of instrument tubing or piping systems.

5. Demonstrate how to properly measure, bend, and install a tubing and/or piping system according to specified drawings.

**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 2 Modules 7 – 11 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. Raceways for Instrumentation

A. Types of conduit, fittings, and supports used in the instrumentation trade

a. Types of metal conduit and their related fittings

b. Types of nonmetal conduit and their related fittings

c. Types of conduit support hardware

B. Preparing and Assembling Various Types of Conduit

a. Cutting various types of conduit

b. Deburring various types of conduit

c. Threading conduit using manual threading equipment

d. Joining conduit with fittings

C. Raceways and Their Related Fittings and Supports

a. Metal raceways and their basic installation considerations

b. Types of wireway fittings

c. Common wireway support components

d. Nonmetallic surface-mounted wireways

e. Cable trays, their related fittings, and support methods

f. Properly handling and storing raceway materials

II. Clean, Purge, and Test Tubing and Piping Systems

A. Cleaning and Purging Process and Methods Used to Complete the Task

a. Cleaning and purging process

b. Methods used to clean and purge tubing and piping systems

B. Piping and Tubing Testing Process

a. Testing process and basic precautions

b. Common test methods

c. Low-pressure pneumatic and hydrostatic testing

d. Minor leak repairs

III. Protective Measures for Instrumentation

A. Electrical Heat Tracing

a. Application of electrical heat tracing on pipelines and their components

b. Power requirements and distribution for electrical heat tracing systems

c. Electrical heat tracing cable products and components

d. Electrical heat tracing system control components and their operation

e. Approaches to monitoring electrical heat tracing system operation

f. Basic installation guidelines for electrical heat tracing systems

B. Protection Schemes for Pipelines and Their Components

a. Steam heat tracing systems

b. Chemical-based burst and freeze protection

c. Types of insulation materials and installation precautions

d. Miscellaneous system protection devices and approaches to protecting instrumentation from physical damage

C. Blow Down Instrument Air and Signal Lines

a. Requirement for a blowdown

b. Systems and components that require a blowdown

c. How to properly blow down instrument air and signal lines

IV. Layout and Installation of Tubing and Piping Systems

A. Factors Related to the Layout of Instrument Tubing or Piping Systems

a. Factors related to the initial planning of instrument tubing or piping installations

b. Considerations in the final layout of instrument tubing or piping systems

c. Developing an isometric sketch of instrument tubing or piping installations

d. Contents of a bill of materials for the installation of an instrument and its process connections

B. Measuring and Bending Tubing

a. How to measure for bending

b. Using a hand-operated, lever-type tubing bender

C. Tubing and Piping Support Components

a. Constant supports, snubbers, and rigid pipe hangers and supports

b. Tubing support components and systems

V. Instrument Air Filters, Regulators, and Dryers

A. Compressed Air Quality Classes and Common Air Filtration Materials

a. Need for clean air

b. Compressed air quality classes relevant to instrumentation air systems

c. Common air filtration materials and characteristics

B. Pneumatic Regulators

a. Direct-operated regulators

b. Pilot-operated regulators

c. Guidelines for selecting a pressure regulator

C. Dryers

a. Absorbent dryers

b. Refrigerated dryers

c. Adsorptive dryers

d. Guidelines for selecting a dryer system