

# **Brazosport College**

## **Syllabus for INTC 2333 – Instrumentation and Installation**

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### **I. COURSE DESCRIPTION:**

#### **INTC 2333 - Instrumentation and Installation CIP 1504040011**

A capstone course in Instrumentation Technology that integrates material from previous courses. Students will design, size, install, connect, and start up a small pilot plant.

**Credit Hours:** 3 (2 lecture, 2 lab)

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Brandon Hartman

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Stephen Reckner

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Kent Bollich

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Gary Hicks

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Dr. Mitchell Seal

January 2022

- A. Prerequisite:** Grade of “C” or better in **INTC 1315, INTC 2410, and INTC 1343.**  
**Required skill level:** College-level reading and writing. Math: College-level with corequisite (placement code 3).

## **II. COURSE OBJECTIVES**

### **A. Safety:**

Course Objective 1: Demonstrate an understanding of how safety and safety equipment is applied to each installation task.

- Enabling Objective 1.1: Correctly write and implement a safe work procedure for each task to be performed.
- Enabling Objective 1.2: Complete a STAC card for each task.
- Enabling Objective 1.3: Complete a safe work permit before each task.

### **B. Diagrams:**

Course Objective 2: Create proper diagrams for the BASF Porch

- Enabling Objective 2.1: Utilize the mass and energy balance sheet for the equipment trainer to determine all flows, levels, temperatures, and pressures.
- Enabling Objective 2.2: Describe the purpose and function of each major piece of equipment and instrumentation in the equipment trainer.
- Enabling Objective 2.3: Draw a piping and instrument diagram of the equipment trainer tracing lines in the trainer.
- Enabling Objective 2.4: Using provided P&ID drawings, evaluate the Drawings and perform corrections based on what is actually in the trainer. (red lines and corrections)

### **C. Design and Documentation:**

Course Objective 3: Given process information, develop specifications for assigned instruments and control valves

- Enabling Objective 3.1: Create an instrument list of all the instruments used in the equipment trainer.
- Enabling Objective 3.2: Create a loop diagram for each assigned installation.
- Enabling Objective 3.3: Given process conditions and equipment specifications in the equipment trainer, determine the instrument ranges for a specific instrument. (level and temperature)
- Enabling Objective 3.5: Create a Instrumentation specification sheet for each instrument loop assigned for installation.

### **D. Installation:**

Course Objective 4: Perform various task related to instrumentation installation.

- Enabling Objective 4.1: Perform calculations and bending of tubing.
- Enabling Objective 4.2: Configure/calibrate the assigned instrument using a HART communication device.

- Enabling Objective 4.3: perform basic wire terminations utilizing standard single pair instrumentation. Understand wire sizes and how they relate to current loads and line resistance. Ensure assigned instrument is properly terminated at the instrument, junction box, and I/O cabinet. Discussion of various input and output cards within the I/O cabinet (AI, AO, DI, DO)
- Enabling Objective 4.4: Discuss the most commonly used tools and test equipment used in instrumentation. Perform assigned tasks demonstrating the use of said items.

### III. STUDENT LEARNING OUTCOMES

OUTCOME	METHOD OF ASSESSMENT
Student learns safety rules and policies applicable to an industrial work environment.	EXAM 1, LAB
Student learns the information on various documents which provide details of plant equipment and process control.	EXAM 1, LAB
Student assembles data to calculate the ranges for calibrating process instruments.	LAB
Student demonstrates knowledge and understanding necessary to assemble process plant control loops.	LAB
Student designs and installs the necessary electrical circuits that form a process control system.	LAB
Student calculates and perform tub bending for various applications	LAB, EXAM 2
Student demonstrates knowledge of wire sizing for load requirements and performs basic wire terminations	LAB, EXAM 2
Student demonstrates use of test equipment	LAB

### IV. TEXTBOOK OR COURSE MATERIAL INFORMATION

#### A. Textbook

1. INTC 2333 Instrumentation and Installation, BC Custom Publisher, November 2016. (required)
2. Visorgogs Safety Glasses (required)
3. Calculator TI-30XIIS (required)

Required course materials are available at the Brazosport College bookstore, on campus or online at <http://brazosport.edu/bookstore/home.html>. A student of this institution is not under any obligation to purchase a textbook from the college bookstore. The same textbook is/may also be available from an independent retailer, including an online retailer.

**For Distance Education Courses include the following:** Contact the Brazosport College Bookstore with a credit card for course materials. Phone: 979-230-3651. Fax: 979-230-3653. Email: [bookstore@brazosport.edu](mailto:bookstore@brazosport.edu). Website: <http://brazosport.edu/bookstore/home.html>.


## B. Course Outline

**This is a sample outline which may vary with individual instructors. It will also vary on whether the course is a summer course or a fall/spring course. Students should contact their instructor of the outline of the course they are taking.**

### SESSION PLANS FOR INTC 2333

Session	Topic	Activity and Objective(s)	Delivery method
1	Course Overview	1. Course Objectives. 2. Safety overview and requirements. Assess plant layout	Lecture (L), Handouts (HO) Lab



2	Diagrams	Discussion of: Process Flow Diagram Piping and Instrumentation Diagrams - Legends and symbols to be used. Begin semester long P&ID correction project	L, HO, and LAB
3	documents	Create loops sheets and instrumentation specifications sheets. Continue P&ID project.	Lab
4	Tools and Test Equipment	Discussion of common tools and test equipment used in instrumentation.  - Multimeter - 475 HART communicator - Temperature calibrator - Pressure calibrator  Review on Exam #1	L, HO
5	Exam #1	Take exam 1	Exam
6	Discuss Exam #1	Return Exam #1 and discuss with class.  Continue with documentation and diagrams projects.	L, HO
7	Fittings	Tube fittings, conduit fittings  Continue with documentation and diagrams projects.	L, HO
8	Wiring and Calibration	Discuss Wiring installation and Calibration Procedures  	L, HO

9	Cable and Tubing	Wiring, Tubing, and installation guidelines.  Discussion of wire sizes and terminations. Perform basic terminations with wire lugs. Start discussion of tube bending	L, HO
10	Tubing	Perform various calculations and bends for tubing. - 90 degree bend - 45/45 offsets/saddles - Tubing square project	L, LAB
11	Exam #2	Take exam #2	EXAM
12	Loop Checks	Perform various Lop checks of assign instruments.  Continue drawings and documents project	Lab
13	P&IDs And other	Continue and Complete drawings and documents project. Perform other tasks related to instrument loops as needed.	Lab
14	Final Review	Review for Final EXAM	Lab
15	Final Exam	FINAL EXAM (comprehensive)	EXAM

### **Important Semester Dates:**

Last Day to Withdraw from Classes– Check BC Academic Calendar at  
<http://catalog.brazosport.edu/index.php>

### **Office Hours:**

For fulltime faculty, office hours may change from semester to semester. Current faculty office hours are included on the syllabus, see link: <https://brazosport.edu/faculty-and-staff/resources/course-syllabi-instructor-information/>

For an adjunct faculty, no office hours are required, and they are not assigned an office. To set up an appointment with an adjunct, contact the instructor as per the email address on the syllabus, see link: <https://brazosport.edu/faculty-and-staff/resources/course-syllabi-instructor-information/>

## **V. STUDENTS WITH DISABILITIES**

Brazosport College is committed to providing equal education opportunities to every student. BC offers services for individuals with special needs and capabilities including counseling, tutoring, equipment, and software to assist students with special needs. For student to receive any accommodation, documentation must be completed in the Office of Disability Services. Please contact Phil Robertson, Special Populations Counselor at 979-230-3236 for further information.

## **VI. TITLE IX STATEMENT**

Brazosport College faculty and staff are committed to supporting students and upholding the College District's non-discrimination policy. Under Title IX and Brazosport College's policy FFDA (Local), discrimination based on sex, gender, sexual orientation, gender identity, and gender expression is prohibited. If you experience an incident of discrimination, we encourage you to report it. While you may talk to a faculty or staff member at BC, please understand that they are "Responsible Employees" and must report what you tell them to college officials. You can also contact the Title IX Coordinators directly by using the contact information below. Additional information is found on the Sexual Misconduct webpage at [www.brazosport.edu/sexualmisconduct](http://www.brazosport.edu/sexualmisconduct).

## **VII. ACADEMIC HONESTY**

Brazosport College assumes that students eligible to perform on the college level are familiar with the ordinary rules governing proper conduct including academic honesty. The principle of academic honesty is that all work presented by you is yours alone. Academic dishonesty including, but not limited to, cheating, plagiarism, and collusion shall be treated appropriately.

Academic dishonesty violates both the policies of this course and the Student Code of Conduct. In this class, any occurrence of academic dishonesty will be referred to the Dean of Student Services for prompt adjudication, and may, at a minimum, result in F, in this course. Sanctions may be imposed beyond your grade in this course by the Dean of Student Services. Please refer to the Brazosport College Student Guide for more information. This is available online at <http://brazosport.edu/students/for-students/student-services/>.

## **VIII. ATTENDANCE AND WITHDRAWAL POLICIES**

Class attendance contributes to your final grade, but you must attend class to successfully complete the course. If you are unable to complete this course, you must complete and submit a withdrawal form with the registrar's office. If the student decides to drop out of the class, it is the responsibility of the student to initiate a withdrawal before the withdrawal deadline in order to get a "W" on their transcript. If this is not done the student will receive a grade based on test grades and class grades earned during their attendance and absence (i.e. zeros on all missed materials, exams, skills tests, and final exam).

## **IX. COURSE REQUIREMENTS AND GRADING POLICY TESTING MAKE-UP POLICY**

### **A. Grading**

Major tests	20%
Cross Disciplinary Skills (work ethic, safety, teamwork, housekeeping, attitude, attendance)	10%
Lab project grades	20%
P&ID project	20%
Final Examination:	30%

Grades are assigned as follows:

Grade	Final Average
A	90-100
B	80-89
C	70-79
D	60-69
F	Below 60

#### **X. STUDENT CONDUCT STATEMENT**

Students are expected to be aware of and follow the Brazosport College Student Code of Conduct. Students have violated the Code if they “fail to comply with any lawful directions, verbal or written, of any official at BC.” Lawful directions include precautions and requirements taken to prevent the spread of COVID 19 at Brazosport College. Students who do not follow safety requirements, including the wearing of a mask, may be removed from class by their instructor and referred to the Dean of Student Services.

#### **XI. COVID-19 STATEMENT**

At Brazosport College, all of us, including faculty, staff and students, share a common goal this spring semester, to keep our classes running in the safest manner possible and avoid any disruption to your progress in achieving your educational and career goals. To that end, we ask and encourage you to conduct yourself in the following manner while on campus this semester:

- Every day, perform a self-health check prior to coming to campus and stay home if sick.
- To the greatest extent possible, maintain your distance between you and other students, faculty, and staff while on campus.
- Wear a properly fitted face covering over your mouth and nose while indoors on campus. If you do not have a mask, they will be available to you in all classrooms this spring.
- Practice good hygiene, washing your hands regularly and/or using hand sanitizer.
- The most effective way to protect yourself from Covid-19 is through vaccination. The vaccine is readily available and at no cost to you. Vaccine information and availability can be found at <https://brazosport.edu/coronavirus/vaccine/>.

If at any time this semester you begin to experience Covid symptoms, or if you are exposed to someone who has tested positive for Covid-19, please take the following steps:

- Stay home if you’re feeling sick and minimize your contact with others.
- Alert the College by completing the Covid-19 Exposure Report Form online at <https://brazosport.edu/coronavirus/report/>. Be sure to provide accurate contact information, including a working phone number that you will answer.
- After submitting the report, you will be promptly contacted by a member of our Rapid Response Team, who will ask you some specific questions about your situation and provide you with guidance moving forward.



- If it is determined that you should not come to class, your instructor will be notified. **Please know that your instructor will consider course adjustments and potential make-up work only if your case has been reported to Brazosport College, and they've been notified by our response team.** Your instructor will work with you to determine how to manage any make-up work.

The Community Health Network (CHN) Clinic at Brazosport College is located in BC Central B-Wing. While walk-ins are available, your visit will be easier if you pre-register by creating an account at [www.mychn.org](http://www.mychn.org). In addition to providing health and behavioral services, CHN also provides COVID vaccinations and testing. All insurance is accepted, and healthcare is provided on a sliding scale including no cost for those who need it.

Throughout the semester, please regularly check the College's Covid-19 information page at <https://brazosport.edu/coronavirus/>, where the latest updates and guidelines will be posted. As members of the BC community, all of us share a responsibility to each other to be as safe as possible.

## **XII. CAMPUS CLOSURE STATEMENT**

Brazosport College is committed to the health and safety of all students, staff, and faculty and adheres to all federal and state guidelines. The College intends to stay open for the duration of the semester and provide access to classes and support services on campus in the safest way possible. The College will also comply with lawful orders given by applicable authorities, including the Governor of Texas, up to and including campus closure. It is possible that on campus activities may be moved online and/or postpone if such orders are given.

## **XIII. STUDENT RESPONSIBILITIES**

Students are expected to fully participate in this course. The following criteria are intended to assist you in being successful in this course:

1. Understand the syllabus requirements
2. Use appropriate time management skills
3. Communicate with the instructor
4. Complete course work on time, and
5. Utilize online components (such as Desire2Learn) as required.

## **XIV. OTHER STUDENT SERVICES INFORMATION**

Information about the Library is available at <http://brazosport.edu/students/for-students/places-services/library/about-the-library/> or by calling 979-230-3310.

For assistance with online courses, an open computer lab, online and make-up testing, audio/visual services, and study skills, visit Learning Services next to the Library, call 979-230-3253, or visit <http://brazosport.edu/students/for-students/places-services/learning-services/>.

For drop-in math tutoring, the writing center, supplemental instructions, and other tutoring including e-tutoring, visit the Student Success Center, call 979-230-3527, or visit <http://brazosport.edu/students/for-students/student-success-center/>

To contact the Physical Sciences and Process Technologies Department call 979-230-3618.

The Student Services provides assistance in the following:

Counseling and Advising	979-230-3040
Financial Aid	979-230-3294
Student Life	979-230-3355

To reach the Information Technology Department for computer, email, or other technical assistance call the Helpdesk at 979-230-3266.



Get the information you need – when you need it. Click <http://geni.us/BRAZO> to install **BC Connect** on your mobile device to receive reminders, explore careers, map your educational plan, be in the know about events, find out about scholarships, achieve your goals and much more.