

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)

Brandon Hartman

Stephen Reckner

Gary Hicks

Jeff Detrick

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- A. Prerequisite:** Grade of “C” or better in INTC 1343.
Required skill level: College-level reading and writing.
Beginning algebra level math (placement code 2).

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: Utilize plant drawings and specifications to install instruments and control valves.

- 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: Without any resource information, draw a flow diagram of the equipment trainer tracing lines in the trainer.
- Enabling Objective 2.4: Without any resource information, draw a piping and instrument diagram of the equipment trainer tracing lines in the trainer.

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 a set of conditions for a given instrument, select the proper instrument.
- Enabling Objective 3.4: Given process conditions and equipment specifications in the equipment trainer, determine the instrument ranges for a specific instrument.
- Enabling Objective 3.5: Given process conditions, determine a Cv value for a given valve.
- Enabling Objective 3.6: Create a specification sheet for each instrument or control valve assigned for installation.

D. Installation:

Course Objective 4: Install and connect field instruments and control valves.

- Enabling Objective 4.1: Perform installation of tubing and piping to the instrument/control valve assigned.
- Enabling Objective 4.2: Configure/calibrate the assigned instrument using a HART communication device.
- Enabling Objective 4.3: Ensure instrument is properly connected to field junction box.
- Enabling Objective 4.4: Ensure instrument is properly connected to control system I/O module.

E. Startup / Troubleshoot:

Course Objective 5: After installation of instruments and control valves are complete, perform a startup/shutdown of equipment trainer.

- Enabling Objective 5.1: Write Start-up/Shut-down Procedures for equipment trainer.
- Enabling Objective 5.2: Check equipment trainer for leaks.
- Enabling Objective 5.3: Perform a loop check to ensure instrument/control valve is operating properly.
- Enabling Objective 5.4: Perform a startup of the equipment trainer troubleshooting any problems that may be encountered.
- Enabling Objective 5.6: Tune control loops.
- Enabling Objective 5.7: Perform a shutdown of the equipment trainer.
- Enabling Objective 5.8: Disassemble instruments/control valves according to instructor's directions.

III. STUDENT LEARNING OUTCOMES

OUTCOME	METHOD OF ASSESSMENT
Student learns safety rules and policies applicable to an industrial work environment.	Student's success on the following questions on the final exam which relate to job site safety will be evaluated: Questions 1, 2, 16
Student learns the information on various documents which provide details of plant equipment and process control.	Student's success on the following questions on the final exam which relate to installation and operation of plant equipment and process control will be evaluated. Questions 3, 4, 6, 7, 8.
Student assembles data to calculate the ranges for calibrating process instruments.	Student's success on the following questions on the final exam which relate to calibration of the various instruments that monitor the process variables will be evaluated: Questions 12, 18

OUTCOME	METHOD OF ASSESSMENT
Student demonstrates knowledge and understanding necessary to assemble process plant control loops.	Student's success on the following questions on the final exam that relate to layout and wiring of the various instruments which comprise a control loop will be evaluated: Questions 10, 14, 19, 20, 21
Student designs and installs the necessary electrical circuits that form a process control system.	Student's success on the following questions on the final exam that relate to designing and building the electrical system for a process control system will be evaluated: Questions: 11,13,17
Student demonstrates the skills required to build a control system in the lab.	Student's success on the completion in the lab of constructing and operating of a process control system will be evaluated and graded by the instructor.

IV. TEXTBOOK OR COURSE MATERIAL INFORMATION

A. Textbook

1. INTC 2333 Instrumentation and Installation, BC Custom Publisher, November 2016.
2. Online access to course material provided by instructor.
3. Visorgogs Safety Glasses
4. Calculator TI-30XIIS

Required course materials are available at the Brazosport College bookstore, on campus or online at <http://www.brazosport.edu/bookstore>. 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. Website:<http://www.brazosport.edu/bookstore>.

B. Course Outline

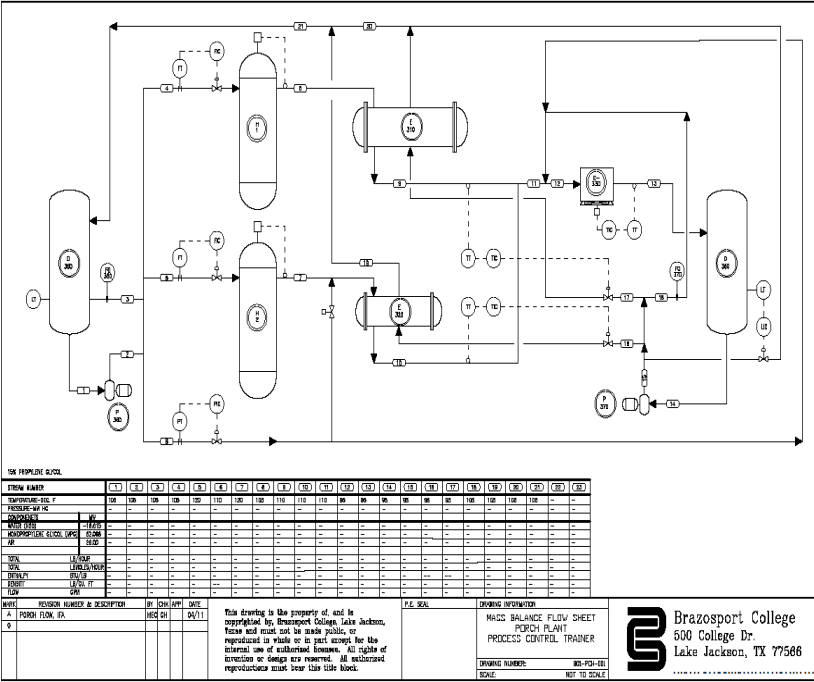

This is a sample outline which may vary with individual instructors. It will also vary on whether the course is a summer course or a fall/spring course. Students should contact their instructor of the outline of the course they are taking.




SESSION PLANS FOR INTC 2333

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



2	Diagrams	Process Flow Diagram Construct infrastructure	L, Overheads (OH) Lab
3	Procedures	Safe work procedures Mount Tanks and large equipment	L, OH Lab

4	P&ID's	<p>P&ID sheets Plant wall-down with P&ID's from Plant A-1. Example:</p>  <p>Review on Exam #1</p>	L, OH HO
5	Exam #1	P&ID's, Inst. Specs, Procedures	Exam
6	<p>Discuss Exam #1</p> <p>Valve Sizing</p>	<p>Return Exam #1 and discuss with class.</p>  <p>Valve Sizing and Valve Calibration</p>	L, OH

7	Fittings	<p>Fittings and instrument details</p> 	L, OH, HO
8	Wiring and Calibration	<p>Discuss Wiring installation Calibration Procedures</p> 	L, OH HO
9	Cable and Tubing	<p>Wiring, Tubing and installation guidelines.</p>  <p>Review Exam #2</p>	L, OH

10	Exam #2	Exam#2 Complete installations	Exam #2
11	Loop Checks	Loop Check and pressure check on completed installations on skid.	Lab
12	Power up Loops	From control panel apply power and start-up loops on skid	Lab
13	Start-up Plant	Using Start-up procedures written in class, start-up plant accordingly. Upon completion of start-up, tune control loops for efficiency.	Lab
14	Dismantle Plant	As time allows, dismantle as much of plant as possible. Review for Final Exam.	Lab
15		FINAL EXAM	EXAM

Important Semester Dates:

Last day to Withdraw from Classes – Check BC Academic Calendar

V. STUDENTS WITH DISABILITIES

Brazosport College is committed to providing equal education opportunities to every student. Brazosport College offers services for individuals with special needs and capabilities including counseling, tutoring, equipment, and software to assist students with special needs. Please contact the Special Populations Counselor, 979.230.3236, for further information.

VI. 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. Please refer to the Brazosport College Student Guide for more information. This is available online at <http://www.brazosport.edu>. Click on the CATALOGS AND SCHEDULES link under STUDENTS.

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. Sanctions may be imposed beyond your grade in this course by the Dean of Student Services.

VII. 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).

VIII. COURSE REQUIREMENTS AND GRADING POLICY TESTING MAKE-UP POLICY

A. Grading

Major tests	40%
Cross Disciplinary Skills (work ethic, safety, teamwork, housekeeping, attitude)	20%
Final Examination: The successful solution of the troubleshooting exercises.	40%

Grades are assigned as follows:

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

IX. 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.

X. OTHER STUDENT SERVICES INFORMATION

Information about the Library is available at <http://www.brazosport.edu/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://www.brazosport.edu/learningservices>.

For drop-in math tutoring, the writing center, supplemental instruction and other tutoring including e-tutoring, visit the Student Success Center, call 979.230.3527, or visit <http://www.brazosport.edu/studentsuccesscenter>.

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.