Brazosport College

Syllabus for INTC 1441 - Principles of Automatic Control

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I. COURSE DESCRIPTION:

INTC 1441 - Principles of Automatic Control CIP 1504040011
Theory of control room operations, automatic control systems and design, closed loop control systems, recorders, controllers, positioners, feedback, on/off control, proportional, reset and rate responses, ratio and cascade controllers, including both pneumatic and electronic systems. **Credit Hours:** 4 (3 lecture, 2 lab)

Brandon Hartman

Stephen Reckner

Gary Hicks

Jeff Detrick

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A. **Prerequisite:** Grade of "C" or better in **INTC 1401**.
Required skill level: College-level reading and writing. Beginning algebra level math (replacement code 2).

II. COURSE OBJECTIVES

1. Introduction to Smart instrumentation, communicators, and test equipment
2. Piping and Instrumentation Drawings and documentation
3. Basic Electric theory (Direct Current)
4. Smart Temperature, pressure, level and flow devices and associated calculations and configuration

III. STUDENT LEARNING OUTCOME

End-of–Course Outcomes: Describe the impact of process variables on automatic control; draw loop, block, and wiring diagrams; and configure associated equipment.

IV. TEXTBOOK OR COURSE MATERIAL INFORMATION

A. Textbook

1. No textbook, materials provided by instructor
2. TI-30XIIS Calculator (required)
3. Visorgogs Safety Glasses (required)

Required course materials are available at the Brazosport College bookstore, on campus or online at http://brazosport.edu/bookstore/home.html. Students are 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://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.

WEEK #	TOPIC
1	Overview of instrumentation and introduction to P&ID's Signal systems and conversions between reading and percent values Basic direct current electrical theory including OHM's Law and Kirchof's Laws Evaluation of series, parallel and combination series/parallel circuits Lab: Three resistor laboratory exercise and introduction to electrical multimeters

WEEK	TOPIC
2	Introduction to calibration and test equipment. Emmerson 475 and Meriam communicators. Fluke 474 and 718 calibrators and multimeters
3	Temperature scales and conversions for Fahrenheit, Celcius, Rankine, Kelvin Conduction convection and radiation principles Types of temperature measuring devices including J, K, E&T Thermocouples, Platinum 100-ohm RTD's, Thermistors, Bimetallic, Infrared Thermometers. Lab: Configure and calibrate Smart Temperature Transmitters for various thermocouples and RTD's using the Fluke 743 calibrator and other pieces of test equipment.
4	Review P&ID's, basic electrical circuit analysis and temperature scales, primary elements, instrument configuration and calibration
5	Test
6	Pressure measurements and scales (Gauge, Vacuum and Absolute) Hydrostatic Head pressure equivalents and conversions between PSI, INWC and INHg Lab: Configure and Calibrate pressure smart pressure transmitter for gauge, absolute and vacuum application using Fluke 743 and 718 calibrators.
7	Review of Level measurement using differential pressure with specific examples of open tank, dry leg, wet leg, bubbler, and interface calculations Specific gravity concepts for liquid and gas Radar and ultrasonic level measurements Archimedes principle and displacer type level and interface applications Lab: Configure and calibrate smart differential pressure transmitter for various level applications Lab: Configure and calibrate a smart radar level transmitter
8	Review of pressure and level sections
9	Test
10	Principles of measurement for mass and volumetric flows Flow principles including velocity profiles, laminar vs turbulent flow and Reynolds numbers Relationship of differential pressure to flow rate with calculations for equivalents Orifice plates and their application in flow measurement Variable Area, Vortex, Magnetic, Doppler, and Ultrasonic flow measurement principles Lab: Configure and calibrate smart transmitters that use D/p, Coriolis, Vortex shedding and Magnetic flowmeter principles.
14	Test Begin final review
15	Final review
16	Final

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

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

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:

Lecture / laboratory participation	20%
Three Unit examinations	40%
Final examination	40%

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. 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.

XII. 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.

XIII. 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 instruction 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 Technology 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 Activities	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.