

# **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)**

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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

**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](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.**

<b>WEEK #</b>	<b>TOPIC</b>
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.
<b>WEEK</b>	<b>TOPIC</b>
2	Introduction to calibration and test equipment.

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

**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:**

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. 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.

### **Class attendance**

Much of the learning occurs in the classroom setting and cannot be made up by reading the a textbook or lecture notes.. Therefore, class participation is essential to your learning and attendance is taken.

### **Class participation**

Participation grade is based on the quality (not frequency) of your contribution. Those receiving high grades in class participation will be those who:

- Are prepared for class
- Arrive for class on time
- Have excellent attendance
- Make comments and ask questions that significantly contribute to the learning environment of the class
- Participate in class activities and demonstrations.

### **Attention in class**

Unless allowed by the instructor, the use of cell phones, classroom or personal computers, or other electronic communication is not permitted. Personal conversations and other distractions are not permitted, and may result in disciplinary action, including a reduction in class grade. Students who take notes on electronic media, or who have an urgent need to remain in contact, should discuss their situations with the instructor.

### **Virtual Campus/D2L:**

Knowing how to use Virtual Campus is an highly suggested to succeed in this course. Locations of technical support information on the Virtual Campus are on the school website, the Virtual Campus login page, on the My Home page, and Course Home areas of each online course.

These areas contain links to:

- technical support manuals & videos
- orientation to online courses
- distance learning website

**Check “Contents” in D2L to keep up with weekly assignments starting your first week. .**

**Deadlines are not flexible. There are only negotiable due to emergencies/event out of your control, and with written excuse from employer, doctor, etc.**

- Students must use D2L to keep up with announcements, assignments, etc. if they miss a class. Assignments are still due the next assigned class period.
- I'd highly recommend forwarding your D2L email to whatever email account you check regularly. This way, you won't miss communications from me in a timely manner.
- Several elements of D2L may be used including Dropbox, Discussions, Contents, Quizzes and more.
- The assignments and quizzes should all appear in "Contents". Contents is a key area for you to check.
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#### **Communications with Instructor**

- Please send any emails to me through D2L or at [@brazosport.edu](mailto:@brazosport.edu). The Brazosport policy is for students nor faculty to communicate via personal email or texting unless urgent/emergency.
- I would highly recommend forwarding your D2L emails to an email account that you check regularly. Instructions for this are on D2L along with other useful resource.
- I would also recommend using the D2L notifications feature to remind you of upcoming assignments and other available topics.

#### **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 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.