

Brazosport College

Syllabus for CTEC 1441: Instrumental Analysis I

Instructor: Dr. Jiaying Chen

Phone: 979-997-2716

Location: Health/Science complex 200 (lecture)

Location: Health/Science complex 200/202 (lab)

Office:

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COURSE DESCRIPTION

Overview of instrumental chemical analysis. Topics include statistical analysis, sampling, analytical separations, gravimetric and titrimetric analysis, gas chromatography, on-line process analyzers, and/or electroanalytical chemistry. (4 SCH, 3 lecture, 3 lab)

PREREQUISITES

A grade of C or better in CHEM 1311/1411 or CHEM 1305/1405.

Required skill level: College-level reading, writing and math.

STUDENT LEARNING OUTCOMES

At the completion of CTEC 1441 the student should be able to:

1. Understand and apply basic statistical methods used in analytical labs.
2. Perform gravimetric analysis calculations and analyze unknowns using gravimetric techniques.
3. Perform volumetric calculations necessary in the preparation of standard solutions.
4. Apply and understand standardization methods used in titrimetric analysis, such as the use of primary standards, indicators, and the titration curve.
5. Understand the various methods of analytical separation, such as distillation, extraction and chromatography.
6. Understand the theory and operation of the gas chromatograph.
7. Receive a grade of D or better in the laboratory portion of the course.

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.

Kelli Forde Spiers, Director, Student Life and Title IX Coordinator
Office J-117D; 979-230-3355; kelli.fordespiers@brazosport.edu

Victoria Young, HR Coordinator and Deputy Title IX Coordinator
Office C-114; 979-230-3303; victoria.young@brazosport.edu

TEXTBOOK and COURSE MATERIAL INFORMATION

1. CTEC 1441, Applied Instrumental Analysis I Class Notes, by Dr. Judy Chu, published by Brazosport College.
2. Analytical Chemistry for Technicians, by John Kenkel. pdf file posted in D2L: <https://online.brazosport.edu/d2l/le/content/19128/viewContent/507018/View>
3. Organic Chemistry Lab Notebook, Published by Signature Labs (required, purchase at bookstore).
4. Scientific Calculator (*smart phones are not allowed as a calculator*).

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.

HOW CURRENT SEMESTER RUN WITH COVID 19 SITUATION STILL GOING

1. All class activities are taking place on campus with all precautions according to the school
2. All lectures will be given in classroom on campus
3. All labs will be conducted in labs on campus.
4. **All exams will be given in classroom (face-to-face), see class schedule for details.**
5. Lectures are given on Mon. and Wed. Be sure to show up on time according to the schedule

LAB REQUIREMENTS

1. Safety glasses (Visorgogs or safety goggles), must meet ANSI Z87.1-1989 certification.
2. Safety glasses must be worn all times while in lab
3. No shorts or open shoes in lab work

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.

ACADEMIC HONESTY POLICY

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>.

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

ATTENDANCE AND WITHDRAWAL POLICIES

Attending classes is important and required in order to successfully complete the course. In the event that prevent you from attending a class, you need to inform your instructor as early as you can, text or call, of the reason for your absence. In case you are experiencing Covid-19 related issues, see the section below (COVID-19 POLICIES AND STATEMENT) for school policies and what you are expected to do. Proof of excuse is required (from your doctor or else) in cases you are unable to attend a class. If you are unable to complete this course, you must complete and submit a withdrawal form with the registrar. If this is not done, the student will receive a grade based on the test grades and class grades earned before he/she stopped coming to class.

COURSE REQUIREMENTS AND GRADING POLICY

For this class you complete the following:

Exams: There will be a total of four open question mid-term exams. *Credit point will be assigned to step-by-step working process (therefore partial credits are earned for each correct step present).* Each exam will last approximately one hour. The exact date of each Exam are shown in class schedule (below in this document). Students are allowed to bring a one-page, all hand written personal notes containing equations, etc., to the exams. *Scientific calculator is required, no cell phone use allowed during exams.*

Homework & quizzes: As assigned by the instructor. A maximum of 10 points (final grade) will be awarded *including bonus points for homework.* All step-by-step work must be shown to obtain full credit for the homework assignments. Submission of homework will be through the Dropbox in D2L. Homework due dates are indicated in corresponding dropboxes. *Bonus points* are awarded to early bird submission (date qualified for early bird submission is given in each dropbox as well).

Lab: All labs are scheduled to Wednesdays (in two sessions). Pre-lab work must be completed before coming to lab and show your pre-lab work before starting your benchtop work, and have your instructor sign your pre-lab work. Lab instructions are located in D2L for you to read in advance and complete your pre-lab work.

The lab work is graded as following which **weighs 40%** in the course:

Pre-lab work	10%
Hands-on performance	60%
Lab report	30%

Please note that due to limited available time, there is no make-up labs, and lab attendance is essential for fulfilling the lab work requirement. To pass the course, the student must successfully complete the laboratory experiments and reports with a grade of D or better for the lab part.

Since lab procedures are performed by single person, pre-lab work is critically important and signature on pre-lab work is enforced.

Final Exam: The final exam will be given on-campus at the end of the course. The final exam is comprehensive (covering all chapters and multiple choice).

WORK SUBMISSION PROCESS:

All work, including homework and lab report, are submitted online into the correct dropbox (each assignment will have a corresponding dropbox with due date set). **Only pdf file format is accepted for all work submitted (Other file format cannot be graded).**

Grading policy

Each of the above requirements counts toward your final grade as follows:

Exams	40%
Homework	5% + up to 5% early bird <u>bonus</u>
Lab	40%
Final	15%

GRADE RANGE:

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

TESTING

See the class calendar for the chapters and dates of the tests. *Students are allowed to bring one page of hand written notes*, containing equations, etc., to the exams. The material to be covered on each exam is as follows:

<u>Exam</u>	<u>Chapters</u>
1	Intro to Analytical Science, Sampling, Gravimetric Analysis
2	Intro to Instrumental Analysis, Analytical Separations, GC
3	Titrimetric Analysis, Acid-Base Titrations
4	Complex Ion Formation, Redox Reactions and Titrations
Final	Comprehensive multiple choice Exam

OFFICE HOURS, QUESTIONS/ANSWERS

There will be no fixed office hours, instead we use 24 hours virtual office hours – e-mail me your questions anytime with your questions, answers will be provided within two business day. Special appointment is available upon request.

MAKE-UP POLICY

There will be **no make-up exams** unless there is an emergency. **One exam score will be replaced by the final exam grade, which can be a missing exam or the lowest one if the final score is higher.** For lab work, there is **no make-up labs**, so attendance for hands-on performance is required.

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. observe all lab work safety requirements
3. Exercise time management skills (including lab work)
4. **using the school email system is required** in communicating with your instructor
5. complete course work on time, and
6. utilize online components (such as Desire2Learn) as required.

PROJECTS, ASSIGNMENTS, PORTFOLIOS, SERVICE LEARNING, INTERNSHIPS, ETC.

None.

OTHER STUDENT SERVICES INFORMATION

Information about the Library is available at

www.brazosport.edu/sites/CurrentStudents/Library/default.aspx or by calling 979-230-3310.

Information about study skills and tutoring for math, reading, writing, biology, chemistry, and other subjects is available in the Learning Assistance Center (LAC); see

www.brazosport.edu/sites/CurrentStudents/LAC/default.aspx or call 979-230-3253.

To contact the Physical Sciences and Process Technology Department call 979-230-3427.

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.

COVID-19 POLICIES AND STATEMENT

At Brazosport College, all of us, including faculty, staff and students, share a common goal this fall 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. 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.

CTEC 1441 – Spring 2022 – Tentative Schedule*

Date		LECTURE (all face to face)	LAB (all face to face)
		Mon & Wed (5:35 - 6:50PM, HS.200)	Monday (7:00 - 9:50 PM, HS.202)
1/19	W	Ch 1 – Introduction to Analytical Science	
1/24	M	Ch 1 – Continued	Lab safety,& report writing
1/26	W	Ch 2 – Sampling	
1/31	M	Ch3 – Gravimetric Analysis	Exp. 1 – Using Excel
2/2	W	Ch 3 – Continued	
2/7	M	Ch 6 – Analytical separation	Exp. 2 – Gravimetric Ana. of Sulfate
2/9	W	Review & Exam 1	
2/14	M	Ch 6 – Continued	Exp. 2 – Gravimetric Sulfate (Cont.)
2/16	W	Ch 12 – Gas Chromatography	
2/21	M	Ch 12 – Continued &	Exp. 3 - GC (session 1 sample prep)
2/23	W	Ch 11 – Analytical Separations	
2/28	M	Ch 11 – Continued	Exp. 3 - GC (session 2, Beer)
3/2	W	Review & Exam 2	
3/7	M	Ch 4– Introduction to Titrimetric Analysis	Exp. 3 - GC (session 3, Gasoline)
3/9	W	Ch 4– Continued	
3/14	M	Spring Break, no class	
3/16	W	Spring Break, no class	
3/21	M	Ch 5.1 – Introduction to titrametric analysis	Exp. 3 - GC (session 4, completion)
3/23	W	Ch 5.2 – Acid base titration	
3/28	M	Ch 5.2 – continued	Exp. 4 - Esterification-1
3/30	W	Review & Exam 3	
4/4	M	Ch 5.3 – Complex Ion Formation	Exp. 4 - Esterification-2
4/6	W	Ch 5.3 – Continued	
4/11	M	Ch 5.3 – Continued	Exp. 5 acid-base titration (session 1)
4/13	W	Ch 5.4 – Oxidation-Reduction Reactions (continued)	
4/18	M	Ch 5.4 – continued	Exp. 5 acid-base titration (session 2)
4/20	W	Ch 5.4 – continued	
4/25	M	Review	Exp. 5 acid-base titration (session 3)
4/27	W	Review & Exam 4	
5/2	M	Review for final	Exp. 6 – Water Hardness
5/4	W	Review for final	
5/9	M	Review & Final Exam (7:15-9:15 pm)	

*The schedule is subject to change.

*Last Day to Withdraw from Class – Thr. 3/31/2022

CTEC 1441 – Applied Instrumental Analysis Spring 2022

Dr. J. Chen

Homework Assignments: Homework is required which contribute 5% to your final grade for homework submitted at due times (check dropbox), **with up to additional 5% bonus for early submission (next to lecture day following completion of a chapter).**

For Exam 1: see due date in dropbox

1 (1, 4, 6, 8, 20, 22, 24, 27, 28, 30, 31)

2 (3, 5, 18)

3 (10, 13, 16, 19, 23, 25, 27, 29, 37, 39)

For Exam 2: see due date in dropbox

6 (6, 9, 23, 25, 27, 28, 29, 39, 45, 47, 51)

11 (7, 9, 11, 14, 16, 24, 27, 28, 39, 41, 49, 50)

12 (1, 6, 10, 11, 13, 17, 26, 29, 31, 43, 45)

For Exam 3: see due date in dropbox

4 (5, 7, 9, 11, 12, 19, 22, 32, 33, 43)

5-2 (7, 10, 11, 13, 18, 27)

For Exam 4: see due date in dropbox

5-3 (37, 40, 41, 46, 50, 54a, 54g, 55a)

5-4 (57, 66, 68[q-u], 75)