

Fall 2021

CHEM 301-101: Chemical Technology

Andrew Naughton

Follow this and additional works at: <https://digitalcommons.njit.edu/chem-syllabi>

Recommended Citation

Naughton, Andrew, "CHEM 301-101: Chemical Technology" (2021). *Chemistry, Environmental and Forensic Science Syllabi*. 402.

<https://digitalcommons.njit.edu/chem-syllabi/402>

This Syllabus is brought to you for free and open access by the NJIT Syllabi at Digital Commons @ NJIT. It has been accepted for inclusion in Chemistry, Environmental and Forensic Science Syllabi by an authorized administrator of Digital Commons @ NJIT. For more information, please contact digitalcommons@njit.edu.

Chemical Technology - Lecture/Lab

Chem301 sections 001, 101 Fall 2021 Course Syllabus

NJIT Academic Integrity Code: All Students should be aware that the Department of Chemistry & Environmental Science (CES) takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION: *Combination of Lecture and Laboratory components*

Course Description: Introduction to chemistry geared for students in Engineering Technology. No prior knowledge of chemistry is assumed or required.

Lecture: Attendance is taken at the beginning of each lecture. You may miss one lecture without excuse. Beyond one absence evidence of an unavoidable situation (Doctors Note, Police Report of a car accident, Jury Duty summons, National Guard Orders, etc.) will be necessary to avoid loss of Participation points for the class. All exams are given during Lecture Hours.

Laboratory: As Qualification of Engineering Programs at NJIT require laboratory experience **Attendance in LAB is MANDATORY:** If you cannot come to lab during your designated in-lab period please inform your instructor as soon as possible so you can be scheduled to work with a different Lab Set for that lab. Missing more than 1 in person Lab class for any reason will result in a failing grade. **Missing more than one Lab for an excused reason will require taking the lab separately to make your degree qualification requirement.**

Number of Credits: 3

Prerequisites: none

Course-Section and Instructors

Course-Section	Day	Lecture Time	Lab Time	Instructor
Chem 301 001	Tuesday	1:00 PM – 2:20 PM FMH 108	2:30 PM – 5:20 PM TIER 207	Dr. Miriam Gulotta
Chem 301 101	Thursday	06:00 PM - 07:55 PM FMH 205	08:05 PM - 10:00 PM TIER 204	Dr. Andrew Naughton

Office Hours: Dr. Gulotta (gulotta@njit.edu) see Canvas page; also available by appointment. Dr. Naughton by appointment (andrew.b.naughton@njit.edu). Dr. Naughton Office hours only by WebEx.

Required Textbook: (Hard Copy or Electronic, your choice)

Title	Chemistry for Engineering Students
Author	Brown & Holme
Edition	3 rd or 4 th
Year	2015 and on
Publisher	Cengage
ISBN #	978-1-337-39890-9

Required Lab manual: Is available on Canvas.

Also Required:

- **Scientific calculator:** capable of handling logs & exponentials. No cell phone, programmable or any other communications/internet active calculator will be permitted on exams.
- **Personal Protective Equipment (PPE) – ALL Required:**
 - Goggles: you must wear protective eye wear whenever you are in lab. If you wear glasses, purchase side shields or goggles designed to fit over your glasses.

- Lab coat: an extra protective layer between your body and your experiment. Designed to cover and protect your arms and your body from your neck down to your knees. It also protects your clothes.
- Shoes: you must wear closed shoes in lab. The shoe itself must cover your entire foot. Sox with sandals are not acceptable.
- Gloves: Nitrile (not latex). A box of gloves is good for 5 people so consider a group purchase. If nitrile gloves are not what is required, I will provide the appropriate substitute.

University-wide Withdrawal Date: The last day to withdraw with a **W** is Wednesday, November 10, 2021. It will be strictly enforced.

POLICIES

All CES students must familiarize themselves with, and adhere to, all official university-wide student policies. CES takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

You must pass BOTH the lecture and the lab portions of the course to be eligible to pass the entire course

LECTURE (60%):

Homework & Exams collectively = 1 exam grade	} Top 3 scores = 80%	Maximum Points
Exam I (tentatively T 9/29 - M 10/5)		100
Exam II (tentatively T 10/27 – M 11/2)		100
Exam III (F 12/4 - R 12/10; the last day of class)		100
Homework		100
Maximum Test and Homework (dropping lowest grade)		300
Class participation (attendance, answering & asking questions, quizzes)	20%	75
Total Grade Lecture Component		375

- Exams administered in Class Lecture time. Exams will be Online, so you must bring a laptop or other suitable internet active computer to class with you for the exam. If you do not have a suitable computer or prefer it, a paper exam can be provided to you, but you must ask for this in advance. Students may bring their own periodic chart or use the version displayed with the projector for the exam.
- **1 exam score must be at least 60 in order to pass the class.**
- The only exam extra credit is on the exams.
- Homework is submitted online to the CANVAS portal and is due at the *beginning* of lecture & is gone over in class; NO late homework is accepted but the lowest score for one homework is dropped.
- Homework points are converted to percent at the end of the semester. The lowest homework score will be dropped.

Makeup Exam Policy: Since 1 exam may be exchanged for the homework grade will normally be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In extraordinary instances due to extended illness arrangements may be made with your professor. If a student has a legitimate reason for an extended illness, the student should contact the Dean of Students office and present written verifiable proof.

LAB (40%): There are 11 labs in this course. 10 labs are in person and 1 lab is online. The lowest grade will be dropped for a total of 10 marked labs. Each lab will be graded on the point scale as detailed below. There are no common lab groups, and everyone submits everything on their own. All submissions are online.

	Maximum points per lab
Pre-Lab Worksheet(s)	5
In-Lab: technique, adherence to safety procedures and lab cleanliness	5
Post-Lab Summary: Write up, Results & Interpretation	15
Total Grade Laboratory Component	25
10 Graded Labs Total	250 Points

- Pre-lab worksheets must be submitted and graded before the student is allowed to do In-Lab experimentation. Pre-Lab

worksheets are submitted one day before the laboratory work via the appropriate CANVAS Portal.

- Anyone without a graded pre-lab worksheet or not wearing the appropriate PPE will be allowed in lab – no exceptions.
- In-Lab, experiments are done by individuals, but you are encouraged to exchange information with other students around.
- You cannot submit data you did not acquire yourself. If you did not execute your own experiments in-lab only the pre-lab work will be counted. Attempts to turn in a post-lab summary will be considered cheating. Due dates for each lab are clearly posted in CANVAS. No lab submissions will be accepted.

Your final letter grade in this course will be based on the following point score out of 625 possible points:

A	>560	C	435 - 459
B+	545 – 559	D	400 - 434
B	500-544	F	<400
C+	460 -500		

The lecturers are empowered to raise grades by one half scale (*i.e.* C → C⁺) in instances where the point score to the next step is close. This will only be considered for individuals who have submitted **every** homework assignment. Do your homework... it pays off in more ways than one.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times. During exams cell phones and smart watches will join your books in your backpack at the front of the classroom. During lab students can take brief calls by stepping out of the lab room. Habitual or lengthy interruptions will result in penalties.

LEARNING OUTCOMES:

- Analyze problems using the scientific method.
- Make computations using metric system units & be able to convert between units.
- Factor in experimental limits in precision when doing calculations.
- Explain how atomic components and their arrangement dictate periodic trends.
- Form ionic compounds from constituent metals, nonmetals, and polyvalent ions.
- A basic understanding of covalent bonding.
- Apply conservation of mass to balancing chemical reactions.
- Determine empirical and molecular formulas
- Balance chemical equations.
- Determine quantities of reactants required or of products produced in a given chemical reaction using the principles of stoichiometry.
- Determine concentrations of aqueous solutions: molarity, mole fraction.
- Determine volumes or concentrations of reactants required or of products produced in a given aqueous reaction using the principles of solution stoichiometry.
- Determine unknown concentrations in acid-base titration reactions.
- Use concentration or density to convert between volume and mass.
- Analyze the effects of intermolecular forces on liquid systems in terms of their effects on physical properties including boiling points, vapor pressure, and solubility.
- Describe the flow of electrons in oxidation-reduction reactions.
- Analyze the conversion and transfer of energy or heat in a chemical reaction.
- Understand the difference between thermodynamic & kinetic effects.
- Analyze voltaic (Galvanic) cells
- Compute cell potentials.
- Understand the operation of batteries & fuel cells

ADDITIONAL RESOURCES

Chemistry Tutoring Center: Located in the Central King Building, Lower Level, Rm. G12. Hours of operation are Monday – Friday 10:00 am - 6:00 pm. For further information please click [here](#).

Good on-line general textbook sources:

1. Chem1 virtual chemistry textbook: <http://www.chem1.com/acad/webtext/virtualtextbook.html>
2. chemMystery is geared for high school but a lot of it applies here too. <http://library.thinkquest.org/3659/>

Accommodation of Disabilities: Office of Accessibility Resources and Services (*formerly known as Disability Support Services*) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you need accommodations due to a disability, please contact Chantonette Lyles, Associate Director at the Office of Accessibility Resources and Services at 973-596-5417 or via email at lyles@njit.edu. The office is in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Office of Accessibility Resources Services office authorizing your accommodations will be required.

For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Accessibility Resources and Services (OARS) website at:

- <http://www5.njit.edu/studentssuccess/disability-support-services/>

Important Dates (See <https://www5.njit.edu/registrar/fall-2021-academic-calendar/>)

- September 1 (W) First Day of Classes
- September 8 (W) 100% withdraw deadline
- September 15 (W) 90% withdraw deadline
- September 29 (W) 50% withdraw deadline
- October 20 (W) 25% withdraw deadline
- November 10 (W) Last day to withdraw
- November 25 – 28 Thanksgiving Recess
- December 10 (F) Last Day of Class for Fall Semester
- December 13, 14 Reading Days
- December 15 – 21 Final Exam Period (There is no Final Exam in this class)
- December 23 Grades are Due

FALL 2021 LECTURE, HOMEWORK AND LAB SCHEDULE.

Wk	T	Th	Lecture	Homework Due	Lab
1	9/7	9/2	Intro, Significant Figures, Units, Density		No lab first week
2	9/14	9/9	Physical Properties, Atomic Structure, Isotopes	Understanding Syllabus (5 pts) EXAM 1 HWK 1	Measurement & Density (T) Measurement & Density (R)
3	9/21	9/16	Periodic Table, Chemical Formulas, Ions & Polyatomic Ions, Ionic Compounds	EXAM 1 HWK 2	Chemical Composition (T) Chemical Composition (R)
4	9/28	9/23	Molecules, Moles, Percent Composition and Chemical Equations	EXAM 1 HWK 3	Synthesis of Soap (T) Synthesis of Soap (R)
5	10/5	9/30	EXAM 1	EXAM 1 HWK 4	No Lab
6	10/12	10/7	Balancing Equations and Stoichiometry		Determining Chemical Formula (T) Determining Chemical Formula (R)
7	10/19	10/14	Molarity and Titration	EXAM 2 HWK 1	Synthesis of Zinc Iodide (T) Synthesis of Zinc Iodide (R)
8	10/26	10/21	Gas Relationships and the Ideal Gas Law	EXAM 2 HWK 2	Using Stoichiometry (T) Using Stoichiometry (R)
9	11/2	10/28	Energy	EXAM 2 HWK 3	Titrations (T) Titrations (R)
10	11/9	11/4	EXAM 2	EXAM 2 HWK 4	No Lab
11	11/16	11/11	Energy Exchange and Thermodynamics		Gas Laws (T) Gas Laws (R)
12	11/23	11/18	Phase Diagrams, Electrochemistry	EXAM 3 HWK 1	Calorimetry (T) Calorimetry (R)
		11/25	THANKSGIVING RECESS		
13	12/7	12/2	Electrochemistry	EXAM 3 HWK 2	Electrochemistry – Battery (T) Electrochemistry – Battery (R)
14	12/9	12/9	WEBEX Exam 3 Review	EXAM-3 HWK 3	Online Lab – Electrochemistry (Reduction) ALL
15	12/21	12/16	EXAM 3	EXAM 3 HWK 4	No Lab