

Fall 2020

## CHEM 301-001: Chemical Technology

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## Chemical Technology - Lecture/Lab

Chem301 sections 001, 003, 101

### Fall 2020 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 (online) and Laboratory (online & in person) components*

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

**Lecture:** 100% online. Always starts the class. The first 80 minutes of class is the lecture. Lab activities commence after a 10 minute break.

**Laboratory:** onsite in small groups. Due to the requirements of social distancing, only a portion of the class can be physically in the laboratory at a time. The class will be divided into 3-Lab sets (A, B, C). If the class has to be broken into more than 3 groups, Two groups will meet sequentially on one day (A1 and A2 for example) where group #1 will meet 10 minutes after lecture and group #2 will meet 2 hours after lecture. The lab will be cleaned between groups. Onsite presence is only required when it's your Lab Set's turn. The other 2 groups will work on components of the lab that do not require in-lab presence.

**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. Only the pre-lab portion (1/3 of the lab) may be submitted if you are not physically in lab. Missing more than 1 in person Lab classes for any reason will result in a failing grade.

**Number of Credits:** 3

**Prerequisites:** none

**Course-Section and Instructors** *\*\*Registrar's Times are neither consistent nor correct; revised times in blue\*\**

| Course-Section | Day      | Lecture Time               | Lab Time                   | Instructor          |
|----------------|----------|----------------------------|----------------------------|---------------------|
| Chem 301 001   | Tuesday  | 12:30 PM - 01:50 PM        | <i>02:00 PM – 05:00 PM</i> | Dr. Miriam Gulotta  |
| Chem 301 003   | Thursday | 11:00 AM - <i>12:20 PM</i> | 12:30 PM - 03:20 PM        | Dr. Miriam Gulotta  |
| Chem 301 101   | Thursday | 06:00 PM - <i>07:20 PM</i> | <i>07:30 PM - 10:00 PM</i> | Dr. Andrew Naughton |

**Office Hours:** Dr. Gulotta ([gulotta@njit.edu](mailto:gulotta@njit.edu)) see Canvas page; also available by appointment. Office Hours Dr. Naughton by appointment ([andrew.b.naughton@njit.edu](mailto:andrew.b.naughton@njit.edu))

#### **Required Textbook:**

|                  |                                    |
|------------------|------------------------------------|
| <b>Title</b>     | Chemistry for Engineering Students |
| <b>Author</b>    | Brown & Holme                      |
| <b>Edition</b>   | 3 <sup>rd</sup> or 4 <sup>th</sup> |
| <b>Year</b>      | 2015 on                            |
| <b>Publisher</b> | Cengage                            |
| <b>ISBN #</b>    |                                    |

**Required Lab manual:** For this semester lab materials will be posted on Canvas.

### Also Required:

- **Scientific calculator:** capable of handling logs & exponentials. No cell phone, programmable or any other multi-tasking calculator will be permitted on exams.
- **Personal Protective Equipment (PPE) – ALL Required: *This semester, NJIT is providing gloves and goggles!***
  - 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 Monday, November 9, 2020. 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 & Quizzes collectively = 1 exam grade   | } Top 3 scores = 80% |
| Exam I (tentatively T 9/29 - M 10/5)   |                      |
| Exam II (tentatively T 10/27 – M 11/2)   |                      |
| Exam III (F 12/4 - R 12/10; the last day of class)   | } 20%                |
| Class participation (answering & asking questions)   |                      |
| <b>Note: In case of snow days, the 3<sup>rd</sup> exam will be held during the final exam period</b> |                      |

- Exams are all online and to be taken outside of class time.
- 1 exam score must be at least 60.
- The only exam extra credit is on the exams.
- Homework is due at the *beginning* of lecture & is gone over in class; NO late homework is accepted but the lowest score is dropped.

**Makeup Exam Policy:** Since 1 exam may be dropped and I give you a week to take them, there 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. In the event that 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 no lab groups for common submissions. Everyone submits everything on their own. All submissions are online.

|   |     |
|---|-----|
| Pre-Lab Worksheet(s)  | 29% |
| Pre-Lab Application(s)  | 29% |
| In-Lab: technique, adherence to safety procedures and lab cleanliness | 13% |
| Post-Lab Summary: Write up, Results & Interpretation                  | 29% |

- Your Lab Set will be given to you at the start of the semester. The Canvas calendar will show which lab set is due to be in-lab. This information is also posted as a table.
- Pre-lab worksheets must be submitted and graded before the student is allowed to do In-Lab experimentation.
- Pre-Lab Applications may be done at any time but must be submitted by the time the Post-Lab Summary is submitted.
- 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.
- 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 are assigned by Lab Set.

Your final letter grade in this course will be based on the following tentative curve:

|           |         |          |              |
|-----------|---------|----------|--------------|
| <b>A</b>  | 100-90  | <b>C</b> | 77.5-70      |
| <b>B+</b> | 89-87.5 | <b>D</b> | 69-65        |
| <b>B</b>  | 87.5-80 | <b>F</b> | 64 and below |
| <b>C+</b> | 79-77.5 |          |              |

**Cellular Phones:** All cellular phones and other electronic devices must be switched off during all class times. 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 actually 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 are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director at the Office of Accessibility Resources and Services at [973-596-5417](tel:973-596-5417) or via email at [lyles@njit.edu](mailto:lyles@njit.edu). The office is located 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 [Fall 2020 Academic Calendar](#))

- September 28 (M) 50% withdraw deadline
- October 19 (M) 25% withdraw deadline
- November 9 (M) Last day to withdraw
- November 25 (W) Friday schedule
- November 26 – 29 *Thanksgiving Recess*
- December 10 (R) Last Day of Class for Fall Semester
- December 11, 14 Reading Days
- December 15 – 21 Final Exam Period
- December 23 Grades are Due

**LAB SCHEDULE:** everyone will attend lab onsite 4x during the semester.

| F2020 Chem301 Calendar & LABS (converged learning)** |       |        |        |  |         |                        |
|--|-------|--------|--------|--|---------|------------------------|
| class #  | T     | R      | T      | Lab#   | Lab Set | Lab title              |
| 1  | 1-Sep | 3-Sep  |        | no one meets in lab - introduction and first lecture |         |                        |
| 2  |       | 10-Sep | 15-Sep | 1  | A       | Physical Properties    |
| 3  |       | 17-Sep | 22-Sep | 1  | B       | Physical Properties    |
| 4  |       | 24-Sep | 29-Sep | 1  | C       | Physical Properties    |
| 5  |       | 1-Oct  | 6-Oct  | 2  | A       | Hydrate Analysis I, II |
| Exam 1 (9/29 - 10/5)                                 |       |        |        |  |         |                        |
| 6  |       | 8-Oct  | 13-Oct | 2  | B       | Hydrate Analysis I, II |
| 7  |       | 15-Oct | 20-Oct | 2  | C       | Hydrate Analysis I, II |
| 8  |       | 22-Oct | 27-Oct | 3  | A       | Chemical Reactions     |
| 9  |       | 29-Oct | 3-Nov  | 3  | B       | Chemical Reactions     |
| Exam 2 (10/27 – 11/2)                                |       |        |        |  |         |                        |
| 10   |       | 5-Nov  | 10-Nov | 3  | C       | Chemical Reactions     |
| 11   |       | 12-Nov | 17-Nov | 4  | A       | calorimetry, battery   |
| 12   |       | 19-Nov | 24-Nov | 4  | B       | calorimetry, battery   |
| 13   | 1-Dec | 3-Dec  |        | 4  | C       | calorimetry, battery   |
| 14   | 8-Dec | 10-Dec |        | Exam 3 (12/4 - 12/10)                                |         |                        |

\*\*social distancing limits the number of students that can be physically in lab at any one time\*\*

Note: there are 2 Tuesday columns because for the 1<sup>st</sup>, 13<sup>th</sup>, and 14<sup>th</sup> classes Tuesday starts the new lab. For classes 2-12, new labs start on Thursday.