

Updated 8/25/21

**NYU Tandon School of Engineering**  
Chemical and Biomolecular Engineering (CBE)  
Course Outline: CM-UY 1003 General Chemistry for Engineers  
**Fall 2021**

Course Pre-requisites: None.

Course Co-requisites: EX-UY 1 (Examination hour)

Course Description: This is a one-semester introductory course in general chemistry. It covers chemical equations, stoichiometry, thermodynamics, gases, atomic and molecular structure, periodic table, chemical bonding, states of matter, chemical equilibrium, organic, inorganic and polymeric materials and electrochemistry. It is a foundation course for most engineering and science majors.

Course Objectives

Upon successful completion of this course, you should have gained the following core competencies:

Apply knowledge of mathematics and science.

Learn independently

Analyze and interpret data appropriately.

Develop an understanding of professional and ethical responsibility

Course Structure

Per week:

3 hours lecture

Section	Meetings	Instructor	Office Hours (on Zoom)	Email
A	Tu & Th 9:30 – 10:50 am JAB 474	Prof. Sun	Wed. 12:30 – 2:30 pm Fri. 12 – 1 pm	donghong.sun@nyu.edu
B	Tu & Th 2 – 3:20 pm JAB 475	Prof. Pollack	TBD	m.pollack@nyu.edu
C	M & W 8 – 9:20 am Online*	Prof. Hagver	Mon. 9:30 – 10:30 am	rhagver@nyu.edu
D	M & W 9:30 – 10:50 am JAB 474	<b>Prof. Surry**</b>	Tues. 1 – 2 pm Fri. 1 – 3 pm <i>And by appointment</i>	j.robinsonsurry@nyu.edu

\* This online section is for students who are unable to get to NYC on time due to visa issues. If you are enrolled in this section but your location on Albert is not listed as Go Local or remote, you must take the exams in person along with the A, B, and D sections of the course. If you have permission to be remote and this is not reflected on Albert, your advisor must email Prof. Surry by Sept. 10 to confirm your remote status.

\*\* Prof. Surry is the General Chemistry Coordinator. Please contact her if you have any concerns about grading or course policies.

## Readings

The required text for the course is: Raymond Chang and Kenneth E. Goldsby, General Chemistry: The Essential Concepts, 7th Ed. available at: NYU Bookstore, 726 Broadway, New York, NY 10003 <http://www.bookstores.nyu.edu/> \$129.00 (includes e-text)

Alternatively, an e-text of the 7th edition can be rented for 180 days at VitalSource:  
<https://www.vitalsource.com/products/general-chemistry-the-essential-concepts-chang-v0077623347> \$47.50

Your textbook has a website maintained by the publisher, which can be reached at: [http://highered.mcgraw-hill.com/sites/0073402753/student\\_view0/index.html](http://highered.mcgraw-hill.com/sites/0073402753/student_view0/index.html)

It contains reviews, computer animations, quizzes, links, and other information that may help you learn the course material.

You will have access to a Brightspace site for your lecture section.

**You are expected to check this site, and your NYU email account, frequently and regularly.**

## Course Requirements

### **Lecture:**

Before coming to class, students are required to read the appropriate section of the text. Students are expected to participate in lecture using the student response system (SRS) or other methods, as described by your lecture instructor.

### **Examinations:**

Two 1 hour 20 minute exams will be given during the semester, and a two-hour final exam will be given at the end of the semester. The midterm exams and the final exam will be all multiple-choice questions. Attached to each exam paper will be a list of physical constants, a list of important equations, and a copy of the periodic table of the elements. You are required to bring a #2 pencil and a non-graphing calculator (TI-30 or similar) to each exam.

The midterm exams will occur during the Exam Hour (not the regular class time).

Midterm Exam 1	October 19, 2021	12:30 PM – 1:50 PM
Midterm Exam 2	November 16, 2021	12:30 PM – 1:50 PM
Cumulative Final Exam	Date and time to be posted by Registrar	(2 hours)

### **Attendance:**

Attendance contributes 5% to your final course grade. Attendance will be taken using the student response system (SRS) or other methods, as described by your lecture instructor.

Attendance will be counted after the end of the add/drop period (Sept. 15) and two unexcused absences will be dropped at the end of the semester when calculating the final attendance grade. Excused absences will not have any effect in your attendance grade.

## Grading:

Final course grades will be calculated as a weighted average of the course components, as shown below:

Component	Weight
Attendance	5%
Exam 1	27.5%
Exam 2	27.5%
Final Exam	40%

### **Anticipated Grade Cutoffs (Subject to Change Depending on the Course Average):**

<b>A</b>	<b>93 – 100</b>	<b>B+</b>	<b>87 – 89</b>	<b>C+</b>	<b>77 – 79</b>	<b>D</b>	<b>60 - 69</b>
<b>A-</b>	<b>90 – 92</b>	<b>B</b>	<b>83 – 86</b>	<b>C</b>	<b>73 – 76</b>	<b>F</b>	<b>Below 60</b>
		<b>B-</b>	<b>80 – 82</b>	<b>C-</b>	<b>70 - 72</b>		

There will be **no make-up exams**. Students who receive an excused absence for a midterm exam will have their final exam grade input as the midterm exam grade. Under no circumstances will a student be allowed to retake an exam.

### **Instructor notification for absences:**

For excused absences for either medical or personal reasons, the student **must email the instructor by the end of the third day after the absence** and **must go through the Office of Student Affairs**, (Deanna Rayment, Dibner Building LC 240C, 646-997-3046, deanna.rayment@nyu.edu) to request a written excuse for all missed classes. For absences due to religious obligations, for scheduled games for Polytechnic team members, for conferences, etc. the student must contact the Office of Student Affairs **ahead of time** to request an excused absence.

The hourly exams are on Tuesday. If a student is absent from an exam, the instructor must be emailed regarding the reason for the absence by the Thursday of that week. (Tuesday counts as the first day, so Thursday is the third day.) Notifying the instructor is required, but the absence is not excused unless and until the instructor receives notification from the Office of Student Affairs. Student Affairs typically requires written documentation (doctor's note, court papers, etc.) Of course, under extreme circumstances, the time requirements regarding notification of the instructor will be waived, but otherwise, the absence is unexcused and the exam grade is zero. Also, if the requirement that the Office of Student Affairs must accept the student's excuse and notify the instructor is not met, the absence is unexcused and the exam grade is zero.

There is a Student Health Center (basement of Rogers Hall, RH B020, 646-997-3456, by appointment, M-F, 9-5). Any documentation from them must also go through Student Affairs if an excused absence is requested.

### **Academic Honesty:**

The University Code of Conduct is found at:

<https://engineering.nyu.edu/sites/default/files/2018-06/code-conduct2-2-16.pdf>

For the first instance of academic dishonesty, the student(s) will receive a zero for the attendance or exam. Any student aiding in academic dishonesty will receive the same penalty as the dishonest student. Any second instance of academic dishonesty will result in expulsion from the course and a grade of "F". Use of websites such as Chegg is strictly prohibited.

### **Tutoring:**

Students can receive free individualized or group tutoring from the Polytechnic Tutoring Center located in JAB 373, 646-997-3425. Their website is found at:

<http://engineering.nyu.edu/academics/support/polytechnic>

### **Diversity and Inclusion:**

The NYU Tandon School of Engineering values an inclusive and equitable environment for all our students. We hope to foster a sense of community in this class and consider it a place where individuals of all backgrounds, beliefs, ethnicities, national origins, gender identities, sexual orientations, religious and political affiliations, and abilities will be treated with respect. It is our intent that all students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. If this standard is not being upheld, please feel free to speak with your lecture instructor and/or Prof. Surry, the General Chemistry Coordinator and Director of the BMS Program (j.robinsonsurry@nyu.edu, RH 801B).

## **Lecture & Exam Schedule**

### **Chang, General Chemistry the Essential Concepts, 7<sup>th</sup> Edition**

<b>Week</b>	<b>Chapter 1 – Introduction</b>	
<b>1</b>	<b>1.4</b>	Physical and chemical properties of matter
	<b>1.5</b>	Measurement
	<b>1.6</b>	Handling numbers
	<b>1.7</b>	Dimensional analysis in solving problems
<b>2</b>	<b>Chapter 2 – Atoms, Molecules, and Ions</b>	
	<b>2.3</b>	Atomic number, mass number, and isotopes
	<b>2.4</b>	The periodic table
	<b>2.5</b>	Molecules and ions
	<b>2.6</b>	Chemical formulas
	<b>2.7</b>	Naming compounds
<b>3</b>	<b>Chapter 3 – Stoichiometry</b>	
	<b>3.1</b>	Atomic mass
	<b>3.2</b>	Avogadro's number and the molar mass of an element
	<b>3.3</b>	Molecular mass
	<b>3.5</b>	Percent composition of compounds
	<b>3.7</b>	Chemical reactions and chemical equations
	<b>3.8</b>	Amounts of reactants and products
	<b>3.9</b>	Limiting reagents
	<b>3.10</b>	Reaction yields

4	<b>Chapter 4 – Reactions in Aqueous Solution</b>	
	4.1	General properties of aqueous solutions
	4.2	Precipitation reactions
	4.3	Acid-Base reactions
	4.4	Oxidation-Reduction reactions
	4.5	Concentration of solutions
	4.6	Solution stoichiometry
5	<b>Chapter 5 - Gases</b>	
	5.1	Substances that exist as gases
	5.2	Pressure of a gas
	5.3	The gas laws
	5.4	The ideal gas equation
	5.5	Dalton's law of partial pressures
6	<b>Chapter 6 – Energy Relationships and Chemical Reactions</b>	
	6.1	The nature of energy and types of energy
	6.2	Energy changes in chemical reactions
	6.3	Introduction to thermodynamics
	6.4	Enthalpy of chemical reactions
	6.5	Calorimetry
	6.6	Standard enthalpy of formation and reaction
7	<b>Exam 1 – Tuesday October 19, 12:30 – 1:50 PM (Ch. 1 – 5)</b>	
	<b>Chapter 7 – The Electronic Structure of Atoms</b>	
	7.5	Quantum mechanics
	7.6	Quantum numbers
	7.7	Atomic orbitals
	7.8	Electron configuration
	7.9	The building-up principle
8	<b>Chapter 8 – The Periodic Table</b>	
	8.2	Periodic classification of the elements
	8.3	Periodic variation in physical properties
	8.4	Ionization energy
9	<b>Chapter 9 – Chemical Bonding I: The Covalent Bond</b>	
	9.1	Lewis dot symbols
	9.2	The ionic bond
	9.4	The covalent bond
	9.5	Electronegativity
	9.6	Writing Lewis structures
	9.9	Exceptions to the octet rule
10	<b>Chapter 10 – Chemical Bonding II: Molecular Geometry &amp; Hybridization</b>	
	10.1	Molecular geometry
	10.2	Dipole moments
	10.3	Valence bond theory
11	<b>Exam 2 – Tuesday Nov. 16, 12:30 – 1:50 PM (Ch. 6 – 10)</b>	
	<b>Chapter 12 – Intermolecular Forces in Liquids and Solids</b>	
	12.1	Kinetic molecular theory of liquids & solids
	12.2	Intermolecular Forces
	12.3	Properties of liquids
	12.5	Bonding in solids
	12.6	Phase changes

<b>12</b>	<b>Chapter 15 – Chemical Equilibrium</b>	
	<b>15.1</b>	The concept of equilibrium
	<b>15.2</b>	Ways of expressing equilibrium constants
	<b>15.3</b>	What does the equilibrium constant tell us?
	<b>15.4</b>	Factors that affect chemical equilibrium
<b>13</b>	<b>Chapter 16 – Acids and Bases</b>	
	<b>16.2</b>	The acid-base properties of water
	<b>16.3</b>	pH - a measure of acidity
	<b>16.4</b>	Strength of acids and bases
	<b>16.5</b>	Weak acids and acid ionization constants
<b>14</b>	<b>Chapter 18 - Thermodynamics</b>	
	<b>18.1</b>	The three laws of thermodynamics
	<b>18.2</b>	Spontaneous processes
	<b>18.3</b>	Entropy
	<b>18.4</b>	The second law of thermodynamics
	<b>18.5</b>	Gibbs Free Energy