General Chemistry I (aka Chem 161) Lecture

Dr. Bryan Langowski

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Lecture: M, W, Th; 12:25-1:20 PM in BE-100 (AUD)

Office Hours: M, W, Th; 1:45-2:45 PM in BE-004

Important Course Information

- Access to Canvas and e-mails associated with Canvas account
- You are responsible for knowing **everything** posted on the Canvas site.
  - If you ask me a question that can be found on Canvas, I will direct you to check Canvas.
  - Canvas already has lots of information regarding recitations, assignments, etc.
- Lecture Schedule under Class Schedule has important Exam Dates and Suggested Problems
  - We will be following “Day Schedule MWTh and MWF 55-minute lectures”
  - Suggested problems different from online assignments
- First Day Course Material on Canvas
  - Last day to opt out is 17SEP2024
- Recitations begin next week
  - Check General Course Information on Canvas for “161 Recitation Policies Fall 2024”

Week 1 Materials/Assignments on Canvas

General Course Information

- Chem 161 Fall 2024 Intro Video
  0 pts
- Syllabus - Course Overview
- Learning Objectives

Online Homework and Recitation

- 161 Recitation Policies - Fall 2024
- Chem 161 Recitation Schedule - Fall 2024

Class Schedule

- Day Lecture Schedule
- Evening Lecture Schedule
- 161 Examination Dates - Fall 2024

Office Hours

- 161 Lecturer Office Hours - Fall 2024

Other Resources and Additional Help

- Periodic Table
- 161 Formula Sheet
- Lecture Videos

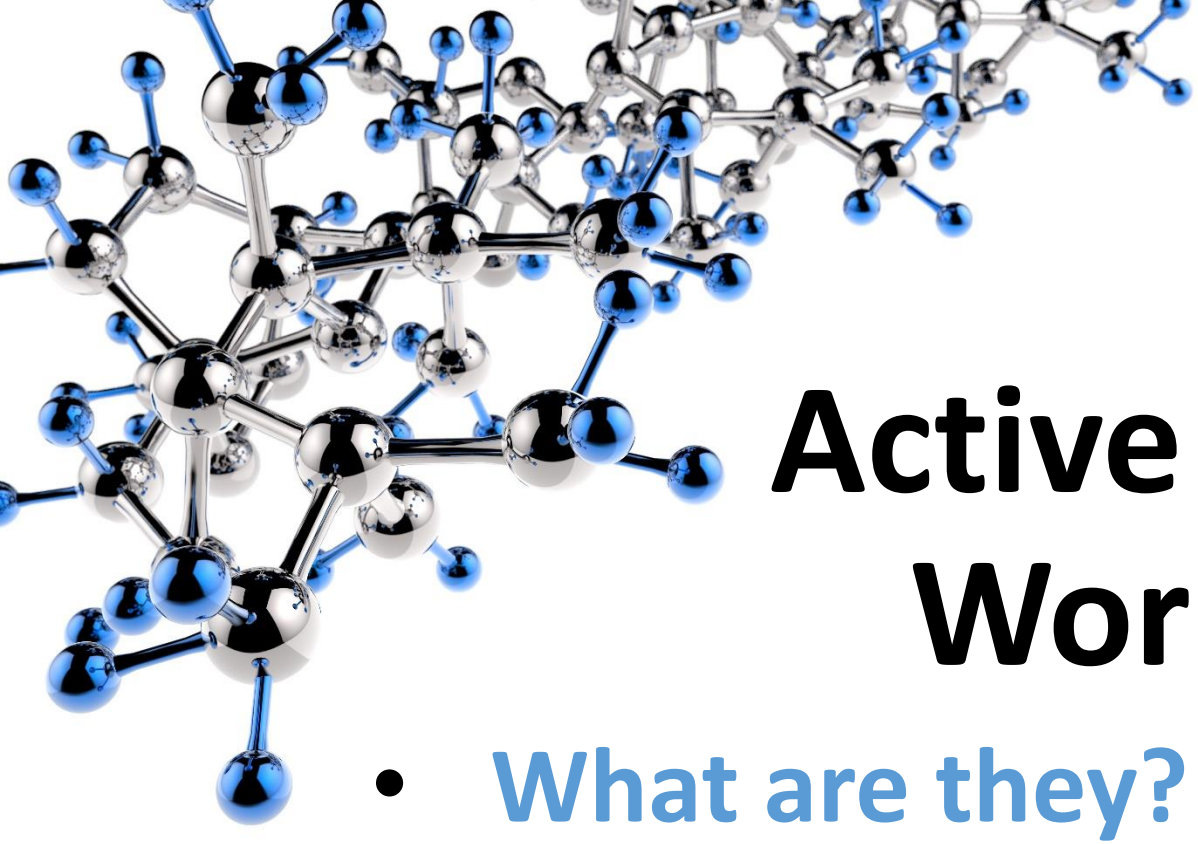
Week 1

Reading Assignments

- Lecture Notes 1

Homework

- Readiness Assessment (DUE 9/3/2024 by 11:59 PM)
  5 pts
- ALW Application - due on Monday Sept 9th at 11:59pm



Active Learning Workshops

- **What are they?**

ALWs aim to guide students to develop a deep understanding of important course content via collaborative, active *problem* solving. **These sessions will replace your weekly recitation.**

- **How to sign up?**

Active Learning Sections

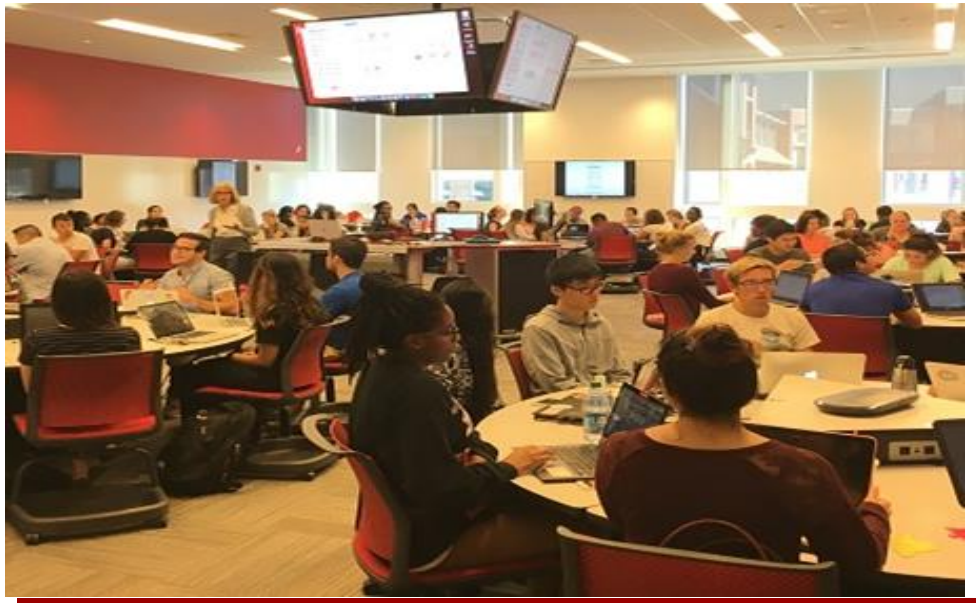
Instructor:

Dr. Francesca Guerra

Meeting Times in person start 9/17/24

- Tuesday: 10:20 AM - 11:40 AM in AB 4400 (College Ave. Academic Building East)
- Tuesday: 12:10-1:30 PM in AB 4400 (College Ave. Academic Building East

Teaching Interns (TIs): undergraduates who have been successful in Gen. Chem. at Rutgers and are trained by the instructors to help guide students during the workshops toward building greater mastery of the concepts and skills necessary for success in Chem 161 and beyond.



https://dcs.rutgers.edu/classrooms/active-learning-spaces

What is Active Learning?

There will be minimal, if any, lecturing by instructors during the session

- You've already attended the lecture period, this time is allocated for you to work through problems, ask questions to the instructor/TA/TI, and answer questions posed by the instructor/TI to demonstrate your understanding
- Weekly in-person, collaborative problem solving with peers and near-peers (TIs)
- More time on task (80-minute sessions) as opposed to 55 minutes.
- Opportunity to more closely interact with peers and form study groups

We expect that you will take advantage of your time in these sessions to

- Struggle productively through the assigned activities
- Practice speaking the language of chemistry and commit to problem solving
- Observe patterns and ways of thinking about general chemistry concepts and principles
- Use the feedback you receive in these sessions to plan your subsequent needs for studying, visiting office hours, or seeking additional help

Steps to apply: All students are required to indicate whether or not they are interested in applying for the ALWs using the survey below.

1. All **Students fill out the Survey** by 11:59 PM (EDT) Monday, September 9th 2024

Survey Link:

https://rutgers.ca1.qualtrics.com/jfe/form/SV_5pBdYkFT4dEE0dw

2. Prior to the first session, you will receive a response indicating if you've been randomly selected to join the ALWs.

3. If selected, you will also be added to an additional Canvas course page associated with the ALWs by **Monday, September 16th 2024**

Important ALW policies

Attendance and participation in group work are mandatory

- Your attendance and participation in the ALWs counts toward your recitation grade for Chem 161. The recitation grade is 5% of your overall Chem 161 course grade.

If you are accepted into ALW and find that you'd prefer to switch back to traditional recitations:

- You will have an opportunity to experience ALW during the first session (Tuesday September 17th). If you find that ALW is not aligned with your instructional preferences, you must e-mail Prof. Guerra informing her of your decision by Thursday September 19 by 11:59 PM).

Additional Help from General Chemistry Teaching Interns (TIs)

Teaching Interns (**TIs**) are undergraduate students who successfully completed general chemistry courses and are eager to help you succeed as well.

TIs will be holding the following help sessions for you this semester:

- **Online Office Hours:** An opportunity to ask questions, discuss new concepts or get help on how to solve problems.

- **Problem-Solving Sessions:** Focus on refining your understanding of concepts and enhancing your problem-solving techniques.

- **Exams Review Sections:** Held for about two hours before each exam to practice exam-style questions.

TIs will begin their sessions in Week 3.

Look for the announcements on Canvas!

Success in Chem 161 – Fall 2024

- Chemistry is a naturally cumulative subject
  - Your understanding/mastering of new material hinges on your understanding of old material
  - There should be a constant feedback loop between old and new material that goes beyond Chem 161 into Chem 162 and organic
- You must do some practice questions immediately after the lecture to solidify your understanding
  - if you wait too long, you'll lose your understanding
- The harder you make your preparation, the better prepared you'll be for the exam
  - only use the formula sheet, a periodic table and your calculator
  - start working under a time constraint right away
  - getting the correct answer is not enough; you must know ***why***
- Use the practice problems to help you *identify and fix your weak spots* rather than doing problems you already know how to do
  - Chemistry is best learned by battling through multi-step questions
- Details matter!!!
  - be precise in your thinking and in your explanations
  - properly executing calculations is just as important as knowing the steps to solving a problem

Success in Chem 161 – Fall 2024 (continued)

Commonly Overlooked **Red Flags**

- consistently getting an answer wrong the first time even if you eventually get the correct answer
- almost getting the right answer or being slightly off numerically
- consistently taking several minutes to solve a problem
- relying on notes, the textbook, or the internet to solve a problem

- Get extra help early and often
  - Once you fall behind, it will be very difficult (if not impossible) to catch up properly

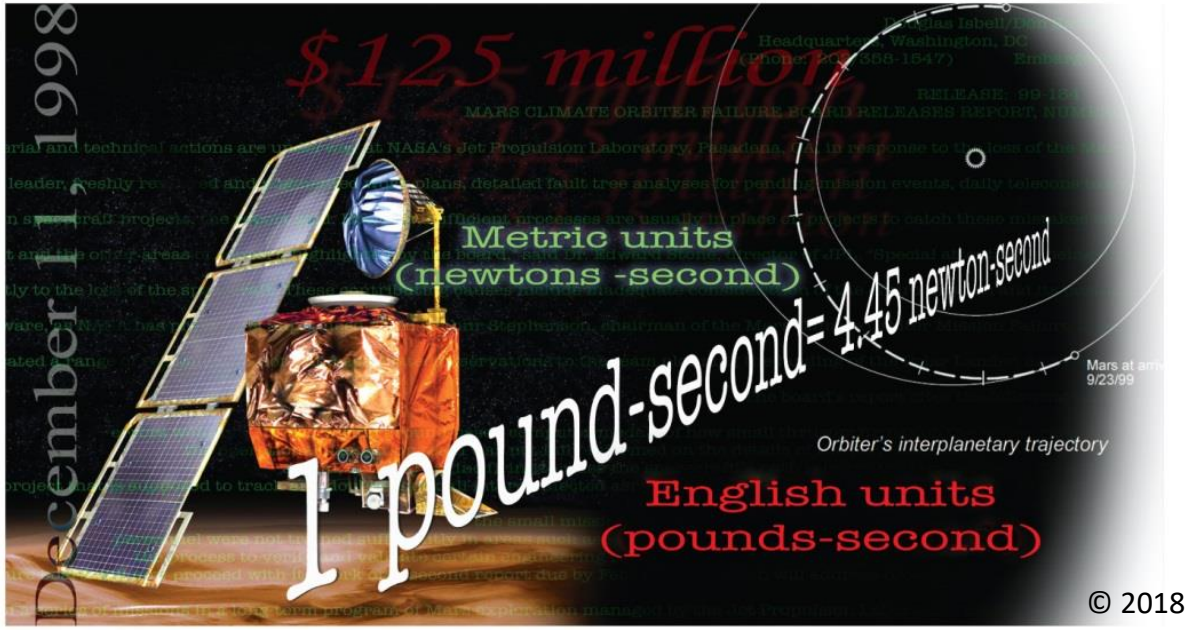
Chapter E: Essentials – Units, Measurement, and Problem Solving

Some questions we'll try to answer

- How do scientists reliably collect and communicate measurements?
- What are the significant digits of a measurement and how do they express precision and uncertainty?
- What are units and why are they important?
- What are some common units for different properties of matter?
- What is density and for what can it be used?
- What are the systematic steps and common pitfalls to unit conversions?
- How do you identify, create, and use conversion factors?

So, you don't think units are important, huh?

- Mars Climate Orbiter



- the Orbiter entered the Martian atmosphere at too low an altitude and disintegrated
- $125 million wasted all because some scientists didn't convert their units from English to metric
- Any time we deal with numbers in science, we have to be responsible and exact as possible and clearly be able to report our measurements to others. Use of units is absolutely crucial!!
- ALWAYS USE YOUR UNITS!!

Measurements in Science

- Usually scientific observations are quantifiable (i.e., can be expressed with numbers)
- quantifiable results are much more exact and unambiguous than vague statements/observations
  - “it’s hot outside” vs. “today’s temperature is 95 °F”
- a measurement is meaningless without a unit (i.e., a standard quantity by which to specify a measurement)
  - English system of units: inches, miles, pounds, quarts, etc.
  - International System of Units: based on the metric system
- ALWAYS USE YOUR UNITS WHEN DOING CALCULATIONS

International System of Units

- a base unit is coupled with a prefix multiplier
  - exception is kg
  - grams (g) acts as the standard unit that is preceded by a prefix
- each base unit is very specifically defined
- prefix denotes a power of ten by which to multiply the base unit

TABLE E.1 SI Base Units

Quantity	Unit	Symbol
Length	Meter ★	m
Mass	Kilogram ★	kg
Time	Second ★	s
Temperature	Kelvin ★	K
Amount of substance	Mole ★	mol
Electric current	Ampere	A
Luminous intensity	Candela	cd

The Standard SI Units – Definitions

- the meter (m), the SI base unit for length
  - defined as the distance light travels in a vacuum in $\frac{1}{299{,}792{,}458}$ seconds

- the kilogram (kg), the SI base unit for mass
  - (prior to May 20, 2019) defined by the mass of a Pt/Ir cylinder kept at the International Bureau of Weights and Measures in France
  - mass is a measure of the quantity of matter within an object
  - weight is a measure of the gravitational pull on an object's matter

- the second (s), the SI base unit for time
  - defined as the duration of 9,192,631,770 periods of the radiation emitted from a transition in a cesium-133 atom (more in Chapter 2…)

The Standard SI Units – Definitions (continued)

- the Kelvin (K), the SI base unit for temperature
  - temperature is a measure of the amount of average kinetic energy of the atoms/molecules that compose a sample of matter
  - (more in Chapter 2 and 9)
- other common units for temperature are °F and °C
- absolute zero is 0 K; theoretically the lowest temperature possible where all atomic motion ceases
- **Δ 1 K = Δ 1 °C = Δ 1.8 °F**

$$°C = \frac{(°F - 32)}{1.8} \text{ and}$$

$$K = °C + 273.15$$