THE UNIVERSITY OF TENNESSEE KNOXVILLE

BIG ORANGE. BIG IDEAS.

# Chemistry 122 - 004, General Chemistry I, Fall 2024


## Dr. Joshua T. Koubek

jkoubek@utk.edu.


***Lectures:***
2:30 PM – 3:45 PM (Tu/Th) Buehler Hall Room 555 (BUE-555)

***Office:*** Strong Hall 304

***Office Hours:*** Mondays, Tuesdays, Wednesday, & Fridays 11:00 am – 12:30 pm or by appointment.
Please send me an email with several days/times you are available to schedule an appointment.

***Email:*** jkoubek@utk.edu. Given the massive amount of email I receive, you must include a subject that is informative and *your name with course number*. Please don't hesitate to email me with updates, questions, or concerns. I will respond to all emails usually in no more than 24 hours. Please note that emails outside of Monday-Friday 8am - 5pm (or during breaks) may have a longer wait time. Check email etiquette on Canvas site under course policies.

***Lecture TA:*** Zane Vickery <zvickery@vols.utk.edu>

***Textbook:*** Zumdahl/Zumdahl/DeCoste's Chemistry: An Atoms First Approach, 3rd Edition, (ISBN 9798214192451). Publisher: Cengage. A package of the digital format of the textbook and online homework materials is provided through the Total Access program. OWLv2 and the e-text are included with your Total Access purchase. There will be an optional loose-leaf textbook available in the VolShop for $31.25 for any student in the Total Access Program. You do not need to purchase a hard copy unless you wish to.

***Canvas*:** Class announcements, lecture notes, course documents, and grades will be posted on Canvas (utk.instructure.com). Students are responsible for monitoring their UTK e-mail account and the course site.

***Clicker*:** A clicker is required for the course. You do not need to purchase a physical clicker since you can use a laptop or your mobile device as a clicker. Please register your clicker online (https://oit.utk.edu/teachingtools/clickers/), please note that you will need to use your @tennessee.edu email address. There will be clicker questions in many lectures. I will count the clickers out of 10 points for each day clickers are used, regardless of the number of questions that day. There are no make-up points for clickers.

***Technical Support*:** For technical issues, contact the OIT HelpDesk by phone at (865) 974-9900 or at the Walk-in HelpDesk,. For IT and Computing issues, use the online Contact Form

***COVID-19 Guidelines: "We will follow the current university policy for COVID-19 at all times."***

***Course Description:*** First course in a two-semester sequence covering fundamental principles of chemistry. Topics covered include atomic structure, the periodic table, Molecular bonding and structure, Chemical Stoichiometry, basic of thermochemistry, and properties of gases.

**I expect from you the following:**

- Be prepared for all classes
- Be respectful of others
- Actively contribute to the learning activities in class
- Abide by the UT Honor Code

***Grading*:**

| | |
|---|---|
| Three exams: | 45% (Exam 1: 15% - Exam 2: 15% - Exam 3: 15%) |
| Online Homework assignments | 15% |
| Quizzes | 15% |
| Participation (Clicker) | 5% |
| Final Exam *(comprehensive)* | 20% |

***Grading Scale*:**

- 94 and above: A
- 88.0 – 93.9 A -
- 84.0 – 87.9 B +
- 80.0 – 83.9 B
- 76.0 – 79.9 B -
- 72.0 – 75.9 C +
- 68.0 – 71.9 C
- 64.0 – 67.9 C -
- 60.0 – 63.9 D +
- 56.0 – 59.9 D
- 52.0 – 55.9 D -
- 51.9 and below F

Note: These letter grade assignments are subject to change, but only in the direction beneficial to the students.

***Exams*:** There will be three (3) 90 minutes evening exams and one (1) two hours Final exam. The three exams will be given on the selected days (see below) at 7:00 – 8:30 pm. The final exam will be given during the final exam period. No make-up exams will be given. If one of the three exams is missed due to excused absence, then the other two exams plus the final exam average will count as the excused exam grade. An excused of missed exam or absence will only be considered with the support of written documentation. The University's Absence Notification Form alone is not sufficient for an exam absence. **The re-grading of an exam** must be requested within **5 school days** of receiving the graded exam. With regrades, the entire exam may be regraded. The final exam will be comprehensive and will count for 20% of the final grade and will be given during final exam week. The room will be announced later in the semester via Canvas and email. Every student is required to take a comprehensive final exam during the schedule exam period. *If the final exam is a higher grade than the lowest exam grade then the final exam grade will replace the lowest exam grade as long as all 3 regular exams are taken.* **A physical copy of an ID (Student ID, Driver's License, etc.) is required for the exam.** *Cell phones are not allowed before, during, and after exams.*

***Exam Schedule*** (All locations are TBA)

Exam 1: Tuesday September 17th from 7:00-8:30 pm

Exam 2: Tuesday October 15th from 7:00-8:30 pm

Exam 3: Tuesday November 12th from 7:00-8:30 pm

Final Exam: Friday December 6th from 1:00 pm – 3:00 pm

***Calculator policy*:** Non-programmable scientific calculators such as TI 30 are allowed. No graphing calculators. Bring a calculator to lecture and exam.

***Quizzes***: We will be having announced OWLv2 quizzes online. These quizzes will cover material from lecture notes, workshops, and reviews. These will count for 15% of your final grade. No makeup quizzes are given. If you miss a quiz due to a university approved excuse you will need to present official documentation to me; the missed quiz will be left out of your grade and the remaining quizzes will be used. The lowest ***TWO*** quiz grade will be dropped at the end of the semester.

***Online Homework*****:** Online homework counts for 15% of the final grade, and no credit will be given after the due date. To access your course materials, you must first login to your Canvas account and click the link for Chem 122 course. Please use your vols account to login. If you see a message saying "you already have an account", then click "forgot password" and reset your account. If you are still having problems then email Ms. Jennifer McCown, Jennifer.mccown@cengage.com. We will be using OWLv2 electronic homework system. Once you get access to the online homework course, you will do the following assignments:

(1) Four short introduction assignments
(2) Quick Prep assignment

These assignments will introduce you to OWLv2 system, and prepare you for the course. Finish these assignments as early as possible so you can focus on the course material we will cover.

You will have four types of homework assignments for each chapter. They are described in the following table

| **Assignment Type** | **Grade** | **Given Attempts** | **Description** | **Best Time to Do the Assignment** |
|---|---|---|---|---|
| **Prerequisite** Math Review | Graded | 10 | Math skills required for the chapter | Before Mastery. Review for math required for the concept. You can't do the Mastery or EOC until you earn 60% in the Math Review Assignment |
| Mastery | Graded | 10 | Single concept questions, comes with group (3 questions per group). Need to answer 2 out of 3 correctly to get credit. | After the concept is covered in each lecture. Don't wait until the chapter is finished and too many concepts are covered. |
| EOC (End Of Chapter) | Graded | 6 | Multi-concept questions, applications | After Mastery assignments and after the chapter is finished. |
| Multimedia Activity | Not graded | | Short videos, simulations | Before lecture, get some ideas what will be covered in lecture |
| Adaptive Study Plan | Not graded | | Test and study plan based on your test result | After chapter is finished, preparation for exams |

***Extra Help*****:** In addition to my office hours, two other resources are available for you:

1) TAs will have office hours that will be announced during the first week of class. All TA office hours will be in the **Chemistry Learning Centers (Buehler 513, Strong 303, and on Zoom)**. It's free and staffed by graduate teaching assistants. Check Canvas for more details about which center is open when.

2) Student Success Center. A supplemental Instruction (SI) is also free for all the students who want to improve their understanding of the course content. For more information, please see https://studentsuccess.utk.edu

**Extra Credit Opportunities:** There will be multiple opportunities for extra credit during the semester. **No individualized extra credit will be given.** Once the opportunity has passed they will not be reopened. Please note that several of these opportunities will occur at the beginning of the semester.

***ACADEMIC DISHONESTY*:** An act of academic dishonesty may lead to such penalties as reduction of grade, probation, suspension, or expulsion from the University. I reserve the right to assign a grade of zero for actions involving violations of the following University of Tennessee Honor Code:

> *"An essential feature of The University of Tennessee is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity."*

IN summary, this course has a zero tolerance policy on cheating. Individual cases will be prosecuted to the full extent possible.

***Generative AI Tools:*** In this course, it is expected that all submitted work is produced by the students themselves. Students must not seek the assistance of Generative AI Tools like ChatGPT. Use of a Generative AI Tool to complete an assignment constitutes academic dishonesty.

***Disability Services*:** The University of Tennessee, Knoxville, is committed to providing an inclusive learning environment for all students. If you anticipate or experience a barrier in this course due to a chronic health condition, a learning, hearing, neurological, mental health, vision, physical, or other kind of disability, or a temporary injury, you are encouraged to contact Student Disability Services (SDS) at 865-974-6087 or sds@utk.edu. An SDS Coordinator will meet with you to develop a plan to ensure you have equitable access to this course. If you are already registered with SDS, please contact your instructor to discuss implementing accommodations included in your course access letter.

***Learning Objectives for General Chemistry 122*:**

1. Learn and become familiar with different units used for measurements, the uncertainty associated with these measurements and how to convert from one unit to another.
2. Learn the terminology (language) of chemistry, including chemical symbols, chemical formulas, nomenclature, and chemical equations.
3. Gain an understanding of atomic structure and the formation of molecules, ions, and compounds.
4. Obtain a good understanding of electronic structures of atoms, the organization and information conveyed by the periodic table of the elements.
5. Acquire a thorough introduction to basic concepts of chemical bonding and modern bonding theories, and be able to predict shapes of molecules and ions.
6. Be able to demonstrate the use of rules and procedures for naming molecular and ionic compounds.
7. Understand the stoichiometry in chemical equations, and be able to apply it to quantitatively predict and analyze the chemical reactions.
8. Obtain knowledge of the basics of thermochemistry.
9. Learn the fundamentals of gases
10. Develop analytic reasoning, mathematical problem solving skills and learn to think critically.

**Always bring your student ID to all lectures, and exams. Keep your cell phone off during exams.**

# TENTATIVE SCHEDULE

## August

| Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|
| 19<br>Classes Start | 20 | 21 | 22 | 23 | 24 | 25 |
| 26<br>Last day to Add/Drop | 27 | 28 | 29 | 30<br>**Extra Credit & Chapter Review HW due by 11:55pm** | 31 | 1-Sep |

## September

| Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|
| 2<br>LABOR DAY<br>NO CLASSES | 3 | 4<br>**Chapter 1 HW due by 11:55pm** | 5 | 6<br>**Quiz 1 Available from 12am-11:55pm** | 7 | 8 |
| 9 | 10 | 11 | 12 | 13<br>**Chapter 2 HW due by 11:55pm** | 14 | 15 |
| 16<br>**Quiz 2 Available from 12am-11:55pm** | 17<br>**UNIT 1 EXAM 7-8:30PM** | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |

## October

| Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|
| 30-Sep | 1 | 2<br>**Chapter 3 HW due by 11:55pm** | 3 | 4<br>**Quiz 3 Available from 12am-11:55pm** | 5 | 6 |
| 7<br>\|----------FALL BREAK - NO CLASSES ----------\| | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15<br>**UNIT 2 EXAM 7-8:30PM** | 16<br>**Chapter 4 HW due by 11:55pm** | 17 | 18<br>**Quiz 4 Available from 12am-11:55pm** | 19 | 20 |
| 21 | 22 | 23 | 24 | 25<br>**Chapter 5 HW due by 11:55pm** | 26 | 27 |
| 28<br>**Quiz 5 Available from 12am-11:55pm** | 29 | 30 | 31 | 1-Nov | 2-Nov | 3-Nov |

## November

| Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|
| 4 | 5<br>ELECTION DAY<br>NO CLASSES | 6 | 7 | 8 | 9 | 10 |
| 11 | 12<br>**UNIT 3 EXAM 7-8:30PM** | 13<br>**Chapter 6 HW due by 11:55pm** | 14 | 15<br>**Quiz 6 Available from 12am-11:55pm** | 16 | 17 |
| 18 | 19 | 20 | 21 | 22<br>**Chapter 7 HW due by 11:55pm** | 23 | 24 |
| 25<br>**Quiz 7 Available from 12am-11:55pm** | 26 | 27<br>\|----------THANKSGIVING RECESS - NO CLASSES ----------\| | 28 | 29 | 30 | 1-Dec |

## December

| Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|
| 2 | 3<br>**Chapter 8 HW & Quiz 8 due by 11:55pm** | 4<br>STUDY DAY<br>NO CLASSES | 5<br>\|----------FINAL EXAMS----------\| | 6<br>**FINAL EXAM 1:00PM-3:00PM** | 7 | 8 |
| 9<br>\|----------FINAL EXAMS----------\| | 10 | 11 | 12 | 13 | 14 | 15 |

**The instructor reserves the right to revise, alter, or amend this syllabus as necessary.**

**Students will be notified in writing / email of any such changes.**

## CHAPTER REVIEW: (8/20-8/27)

Units of measure, uncertainty, significant figures, dimensional analysis, temperature, density, matter, energy, moles

## CHAPTER 1: (8/27-8/29)

Scientific method, fundamental chemical laws, atomic theory, the atom, atomic structure

## CHAPTER 2: (8/29-9/10)

Electromagnetic radiation, matter, hydrogen spectrum, Bohr model, quantum model, quantum numbers, orbitals shapes & energies, Pauli principle, periodic trends

## CHAPTER 3: (9/12-9/26)

Chemical bonds, electronegativity, electron configurations, covalent bonds, localized electron bonding model, Lewis structures, resonance, nomenclature

## CHAPTER 4: (9/26-10/10)

VSEPR model, polarity, dipole moments, hybridization, molecular orbital model

## CHAPTER 5: (10/10-10/22)

Counting, atomic mass, moles, molar mass, % composition, chemical formulas, chemical equations, stoichiometry & limiting reactants

## CHAPTER 6: (10/22-11/7)

Aqueous solutions, precipitation reactions, acid-base reactions, oxidation-reduction reactions

## CHAPTER 7: (11/7-11/19)

Enthalpy, calorimetry, bond dissociations, Hess's law, standard enthalpy of formation

## CHAPTER 8: (11/21-11/26

Pressure, ideal gas law, Dalton's law of partial pressures, kinetic molecular theory of gases, effusion & diffusion