

# Elementary Chemistry for Health Sciences



The University of Toledo  
College of Natural Sciences and Mathematics  
Department of Chemistry and Biochemistry  
CHEM1110:001

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**Office Location:** BO 2086-H  
**Office Phone:** 419-530-2566  
**Term:** Spring 2022

**Lecture Location:** BO 1045  
**Lecture Day/Time:** Tues, Thurs 11 am -12:30 pm  
**Credit Hours:** 3  
**Office Hours:** Wed: 10:00 am – 12:00 pm,  
Tues & Thurs 1:00 pm - 3:00 pm

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## COURSE/CATALOG DESCRIPTION

The study of chemistry for students that are studying nursing or other allied health related fields who have not had a previous course in chemistry or whose preparation in chemistry is not sufficient to begin Chemistry for Health Sciences (CHEM 1120).

## COURSE OVERVIEW

CHEM 1110 is the introductory chemistry course to prepare students for CHEM 1120 – Chemistry for Health Sciences. As a prerequisite to CHEM 1120 – Chemistry for Health Sciences, it is offered for students that did not meet the criteria for direct entrance into CHEM 1120. The grade of C or higher is required in CHEM 1110 to continue on to CHEM 1120. It provides a basic foundation in math and the principles of general chemistry needed to continue on to CHEM 1120. This course is typically taken by nursing students, elementary education students, sports management students, and some science majors who do not want or need the more rigorous chemistry background that is provided by two or three years of chemistry courses. It is not appropriate for chemistry majors and may be too rigorous for non-science majors who are only interested in fulfilling their general education science core requirement. If you have any questions about course placement, please see me as soon as possible.

## TEACHING STRATEGIES

**Lecture:** Attendance is required, **please arrive on time**. You are responsible for all material and problems covered in class. You will be provided with partial lecture outlines of the course material via Blackboard. Use these notes to follow along in lecture.

**Participation Points:** These points will be given in lecture and will mostly come from utilization of the Learning Catalytics interactive polling software.

**Textbook:** The text book is inclusive with the course and you should obtain one from the bookstore before class starts. Please read the text before the lecture to the best of your ability so you are familiar with concepts before hearing about them during each class session.

## PREREQUISITES AND COREQUISITES

One of the following: ACT math score of 20 or higher, College Algebra Test score of 10 or higher, ALEKS math score of 46 or higher, completion of MATH 1200 with a grade of C or higher, or placement into any higher level math course (1320, 1340, 1750, 1830, 1850).

## REQUIRED TEXTS AND ANCILLARY MATERIALS

**Required Textbook:** *General, Organic, and Biological Chemistry: The Structures of Life*, 6<sup>th</sup> ed, 2019, Timberlake, Prentice Hall

**Required Online Homework Access Code:** Modified Mastering Chemistry and Learning Catalytics are included with the text as part as your course costs. Mastering Chemistry is weekly online homework while Learning Catalytics is used in the classroom for participation points and review of topics learned. I will show you how to access these during the first day of class.

## TECHNOLOGY REQUIREMENTS

Blackboard (<https://blackboard.utdl.edu/webapps/login/>) and Modified Mastering Chemistry (available through the Blackboard course) will be used on a regular basis in this course. Students need to have access to a properly functioning computer throughout the semester. Student computers need to be capable of running the latest versions of plug-ins, recent software and have the necessary tools to be kept free of viruses and spyware. Updated software is available from the [Online Learning Download Center](https://www.utoledo.edu/dl/main/downloads.html) (<https://www.utoledo.edu/dl/main/downloads.html>).

For exams, students may use an approved calculator. Any calculator that is programmable, whether graphing or non-graphing, and any calculator based on a phone or other device that can receive or transmit data, are prohibited. A list of approved calculators is in a document within the Additional Handouts section of Blackboard.

Students are required to have a web-enabled device (smartphone, laptop computer, iPod, or other device that connects to the internet will work) for use in all lecture classes. You may borrow a laptop from the library if necessary. This is primarily for the Learning Catalytics software that I will alert you about before we use it.

## UNIVERSITY POLICIES

Policy Statement on Non-Discrimination on the basis of Disability (ADA):

The University is an equal opportunity educational institution. Please read [The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance](#).

## ACADEMIC ACCOMMODATIONS

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the [Student Disability Services Office](#).

## COPYRIGHT NOTICE

The materials in the course website are only for the use of students enrolled in this course for purposes associated with this course, and may not be retained or further disseminated.

## ACADEMIC POLICIES

**Examinations:** There will be 3, 1-hour exams and a 2-hour final exam. Excused absences will only be given based on conditions outlined below. If an excuse is acceptable, your missed exam score will be replaced with a score equal to the average of the other hour exams. The final exam cannot be excused. For all exams you must show a **photo ID card**. You may use a **non-programmable calculator**. You cannot use a programmable calculator or phone.

**Exam Absence Policies:** Students who will not be able to take an exam at the scheduled time due to an irresolvable conflict must provide **written** documentation to verify the conflict. This may occur for students on official university business for example. The exam will be given at another arranged time **before** the scheduled test date. Approval must be obtained in advance.

Students who unexpectedly miss an exam due to illness, car accident or similar **extreme** circumstance should inform me *ASAP*. **Documentation** such as a physician's note, an accident report, etc. is required and must be attached to an **Absence Report Form** (obtained from BO 2022). Also, please email me within 24 hours of the missed exam so that I can assist you as best as I can. In all other cases a missed exam will result in 0 on the exam.

**Important Note:** Students that miss the exam due to quarantining due to a positive Covid-19 test will need to contact me as soon as possible so that I can make accommodations for them to take the missed exam.

**Academic Dishonesty:** Refer to the university's policy on Academic Dishonesty in the university catalogue. Violation of this policy can result in a course grade of **F** with additional university sanctions possible. You will be required to formally acknowledge the terms of our **Academic Honesty Statement**, by providing a statement through our Blackboard course page. I will show you where this form is on the first day of class.

## COURSE EXPECTATIONS

1. Attendance is required for the lecture. I understand if you are unable to attend lecture if you are ill or if an emergency situation occurs. Please reach out to your other classmates for notes or come to my office hours to get caught up.
2. Read the textbook before the lecture. The course schedule is listed at the end of the syllabus. We will go over most notes in lecture, but it is advantageous to pre-read the textbook as well. It is ok if you do not fully understand the topics if you pre-read.
3. You are responsible for all material and problems covered in class. If at anytime that you have issues, please reach out to either me or the supplemental instruction (SI) leader for the course for help.

4. Bring your web-enabled device and a calculator to lecture since we will use Learning Catalytics occasionally. I will let you know when we will use Learning Catalytics.
5. Each week, Mastering Chemistry online homework assignments have to be completed before the deadline. I do give extensions to these assignments with legitimate reasons. Please ask if you need help.
6. If you need extra help, see your instructor during office hours or send me an email. You will not be graded or judged based on the questions that you ask! We also have a supplemental instruction leader (SI leader) if you need additional help. I will let you know when he/she is available on the first day of class.
7. Seek help in the **Chemistry Help Center** (BO 2043) as well. This is the area where teaching assistants (TA) hold their office hours. We do not have a designated TA for this course, but all TAs should be able to help you with this material.

## ASCEND SURVEYS

This semester, we will use a survey system to help me track how well the course is progressing. This is done through a program called Ascend, which is given by a select number of professors called Equity Champions. The surveys are meant to provide me with data that will go over several areas relating to equity and equality in the classroom. As an Equity Champion, I am determined to help students in need. There will be 3 occasions where the surveys will be implemented in the classroom. The surveys will ask you the same questions each time and we will look at anonymous data throughout the semester. You will be given 5 points of extra credit for completing each survey (so a total of 15 extra credit points total). We will go over how to access the surveys during the first week of class.

## GRADING

It is a very high priority of mine to ensure fairness and equity in all grading aspects of the course. There is nothing about this class that requires a certain number of students to get a certain grade. I do not use a curve, but there are some extra credit opportunities.

**Course Points:** The following is the distribution of possible points in the course:

Exams: 3 exams at 100 points each	300 pts	46 %
Final Exam	200 pts	31 %
Mastering Chemistry (online HW)*	100 pts	15 %
Participation points*	50 pts	8 %
<b>Total:</b>	<b>650 pts</b>	

\* These categories will have extra points available to allow students a chance to reach the total points. However, points added to the total grade will not exceed total points for a category.

The grading scale for this class is:

A	100-90%	A-	89-87%	B+	86-84%
B	83-80%	B-	79-76%	C+	75-73%
C	72-67%	C-	66-64%	D+	63-61%
D	60-57%	D-	56-54%	F	< 54%

Course drop and withdrawal procedures have been set by the University of Toledo. **The deadline for adding/dropping is February 1<sup>st</sup>, 2022. You may *withdraw* from the course and receive a grade of W. The withdrawal period is February 2<sup>nd</sup> – March 25<sup>th</sup>, 2022. W's do not affect your GPA.**

You can also find these deadlines on the UT website, under the Academic Calendar and on the Registrar's page for deadlines.

A course grade of **Incomplete** is given only to those who have completed all but a small percentage of course requirements for an acceptable reason. The Incomplete must be removed before you take CHEM 1120 – Chemistry for the Health Sciences.

**All course points and grades will be frequently updated on blackboard** including a **midterm grade**.

Although this is not your final grade in the course, a midterm grade should be taken seriously. This grade will display how well you are doing in the course approximately half-way through the semester.

## COMMUNICATION GUIDELINES

As your instructor, I am here to help, and will do my best to respond to email within 24 to 48 hours. Make sure to check your UT email account and Blackboard's announcements frequently for important course information. If I have not responded to your email after 2 days, do not hesitate to send me a reminder email. I obtain a ton of emails each day, so your email may have become overlooked.

## STUDENT SUPPORT SERVICES

**Course scheduling assistance:** For any rescheduling of chemistry related courses, please contact our Chemistry Department Secretary, Ms. Samples. She is in Room BO 2022 and her number is (419) 530-2698.

**Chemistry Help Center, Room BO 2043:** This is where the teaching assistants hold their office hours so it is a great place to receive assistance. It is generally open all day Monday through Friday & evenings Monday through Thursday. A schedule will be posted early in the term. No appointment is necessary.

**Tutoring support:** All UT students can consult for tutoring through the **Learning Enhancement Center** located in the Carlson Library. This is also where our SI leader usually hosts their tutoring hours.

**Instructor Office Hours:** These are times when you can stop by my office (no appointment needed) with questions about the course material, grades, and any concerns with the course. My office hour times and location are listed at the top of the syllabus (page 1) and are posted outside of my office on the wall. If you have a scheduling conflict with the listed times and want to meet with me, we can schedule a different time to meet.

## **SPECIAL COURSE EXPECTATIONS DURING COVID-19**

Maintaining a safe campus during the ongoing COVID-19 pandemic remains a top priority. UToledo continues to follow the guidance of the U.S. Centers for Disease Control and Prevention and Ohio Department of Health to keep our campus safe.

## **ATTENDANCE**

The University of Toledo has a missed class policy. It is important that students and instructors discuss attendance requirements for the course. Before coming to campus each day, students should take their temperature and complete a self-assessment for symptoms of COVID-19, such as cough, chills, fatigue or shortness of breath. Anyone with a temperature at or above 100.0 degrees Fahrenheit or who is experiencing symptoms consistent with COVID-19 should not come to campus and contact their primary care physician or the University Health Center at 419.530.5549. For more information on the symptoms of COVID-19, please go to

<https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>

COVID-19 testing for sick students is available on both Main Campus and Health Science Campus. Call 419.383.4545 for an appointment. Absences due to COVID-19 quarantine or isolation requirements are considered excused absences. Students should notify their instructors and follow the protocols summarized in this document on [Navigating COVID-Related Course Concerns](#).

In the event that you have tested positive for COVID-19 or have been diagnosed as a probable case, please review the [CDC guidance](#) on self-isolation and symptom monitoring, and report the disclosure to the Division of Student Affairs by emailing [StudentAffairs@utoledo.edu](mailto:StudentAffairs@utoledo.edu) or by connecting with their on-call representative at 419.343.9946. Disclosure is voluntary and will only be shared on a need to know basis with staff such as in the Office of Student Advocacy and Support, The Office of Residence Life, and/or the Office of Accessibility and Disability Resources to coordinate supportive measures and meet contact tracing requirements.

## **FACE COVERINGS**

Face coverings are required while on campus, except while eating, alone in an enclosed space, or outdoors practicing social distancing. Students will not be permitted in class without a face covering. If you have a medical reason preventing you from wearing a face covering due to a health condition deemed high-risk by the CDC, submit an [online application](#) to request an accommodation through the Office of Accessibility and Disability Resources. Students will need to provide documentation that verifies their health condition or disability and supports the need for accommodations. Students already affiliated with the Office of Accessibility and Disability Resources who would like to request additional accommodations due to the impact of COVID-19, should contact their accessibility specialist to discuss their specific needs. You may connect with the office by calling 419.530.4981 or sending an email to [StudentDisability@utoledo.edu](mailto:StudentDisability@utoledo.edu).

## **VACCINATION**

Doctors and other health care professionals agree that the best way to protect ourselves and each other is to get vaccinated. Case data clearly show that vaccines remain highly effective at preventing serious illness from COVID, including the highly contagious delta variant. If you have not yet received your COVID vaccine, the University encourages you do so as soon as possible. No appointment is needed to get the shot at the UPMC Outpatient Pharmacy, University Health Clinic or Main Campus Pharmacy. Once you receive the COVID vaccination, please register on the COVID Vaccine Registry site at: <https://utvaccinereg.utoledo.edu/>.

## SPECIAL NOTES

It's important to note, that based on the unpredictability of the COVID-19 virus, things can change at any time. So please be patient and understanding as we move through the semester. I also ask that you keep me informed of concerns you may have about class, completing course work/assignments timely and/or health concerns related to COVID.

## COURSE SCHEDULE

The following table will give you a general idea of our pace throughout the course. Exams are scheduled to occur on the dates indicated below but can be moved based on our progression through the semester. Material covered on each exam will be dependent on the pace of the class and will be specified in lecture prior to each exam. Each chapter listed is consistent with the learning outcomes after this table.

Week	Dates	Chapter	Notes
1	Jan 17 <sup>th</sup> - 21 <sup>st</sup>	Introduction 1. Chemistry in Our Lives	
2	Jan 24 <sup>th</sup> – 28 <sup>th</sup>	2. Chemistry and Measurements	
3	Jan 31 <sup>st</sup> – Feb 4 <sup>th</sup>	3. Matter and Energy	The last day to drop is Feb 1 <sup>st</sup>
4	Feb 7 <sup>th</sup> – Feb 11 <sup>th</sup>	3. Matter and Energy	
5	Feb 14 <sup>th</sup> – Feb 18 <sup>th</sup>	4. Atoms (or exam 1 review)	<b>Exam 1: Chapters 1-3 Feb 17<sup>th</sup></b>
6	Feb 21 <sup>st</sup> – Feb 25 <sup>th</sup>	4. Atoms	
7	Feb 28 <sup>th</sup> – Mar 4 <sup>th</sup>	6. Ionic and Molecular Compounds	
8	Mar 7 <sup>th</sup> – Mar 11 <sup>th</sup>	<b>SPRING BREAK</b>	No classes meet
9	Mar 14 <sup>th</sup> – Mar 18 <sup>th</sup>	6. Ionic and Molecular Compounds	The last day to drop is March 25 <sup>th</sup>
10	Mar 21 <sup>st</sup> – Mar 25 <sup>th</sup>	7. Chemical Reactions and Quantities	<b>Exam 2: Chapters 4-6 and a review of Exam 1, Mar 22<sup>nd</sup></b>
11	Mar 28 <sup>th</sup> – Apr 1 <sup>st</sup>	7. Chemical Reactions and Quantities	
12	Apr 4 <sup>th</sup> – Apr 8 <sup>th</sup>	7. Chemical Reactions and Quantities	
13	Apr 11 <sup>th</sup> – Apr 15 <sup>th</sup>	7. Chemical Reactions and Quantities	
14	Apr 18 <sup>th</sup> – Apr 22 <sup>nd</sup>	8. Gases	
15	Apr 25 <sup>th</sup> – Apr 29 <sup>th</sup>	5. Nuclear Chemistry	<b>Exam 3: Chapter 7-8 and a review of exams 1 and 2, April 26<sup>th</sup></b>

Finals Week	May 1 <sup>st</sup> – May 6 <sup>th</sup>	The Final Exam will be comprehensive; including chapters 1-8 from your book.	<p><b>*****Final Exam*****</b></p> <p><b>Tuesday May 3<sup>rd</sup> 12:30 pm – 2:30 pm</b></p> <p><b>YOU MUST TAKE THE FINAL EXAM AT THIS TIME!</b></p>
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## STUDENT LEARNING OUTCOMES (Expanded Per Chapter)

### *Chapter 1 Chemistry in Our Lives*

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Read and interpret graphs and data.
- Demonstrate an understanding of the impact of science on society.
- Define the term chemistry and identify substances as chemicals.
- Describe the activities of the scientific method.
- Review math concepts used in chemistry such as place values, positive and negative numbers, percentages, solving equations, interpreting graphs, and writing numbers in scientific notation.

### *Chapter 2 Chemistry and Measurement*

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Read and interpret graphs and data.
- Demonstrate an understanding of the impact of science on society.
- Write the names and abbreviations for metric or SI units used in measurements of length, volume, mass, temperature, and time.
- Identify a number as measured or exact; determine the number of significant figures in a measured number.
- Adjust calculated answers to give the correct number of significant figures.
- Use the numerical values of prefixes to write a metric equality.
- Write a conversion factor for two units that describe the same quantity.
- Use conversion factors to change from one unit to another.
- Calculate the density or specific gravity of a substance; use the density or specific gravity to calculate the mass or volume of a substance.

### *Chapter 3 Matter and Energy*

- Demonstrate the ability to think critically and employ critical thinking skills.
- Read and interpret graphs and data.
- Demonstrate an understanding of the impact of science on society.
- Classify examples of matter as pure substances or mixtures.
- Classify examples of pure substances as elements or compounds.
- Classify examples of mixtures as homogenous or heterogeneous.
- Identify the states and the physical and chemical properties of matter.
- Given a temperature calculate a corresponding temperature on another scale.



- Identify energy as potential or kinetic; convert between units of energy.
- Use specific heat to calculate the quantity of heat lost or gained during a temperature change.
- Describe the changes of states between solids, liquids, and gases; calculate the energy involved.

#### *Chapter 4 Atoms*

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Read and interpret graphs and data.
- Demonstrate an understanding of the impact of science on society.
- Given the name of an element, write its correct symbol; from the symbol, write the correct name.
- Use the periodic table to identify the group and the period of an element; identify the element as a metal, nonmetal, or metalloid.
- Describe the electrical charge and location in an atom for a proton, a neutron, and an electron.
- Given the atomic number and the mass number of an atom, state the number of protons, neutrons, and electrons.
- Give the number of protons, neutrons, and electrons in one or more of the isotopes of an element.
- Calculate the atomic mass of an element using the abundance and mass of its naturally occurring isotopes.
- Describe the energy levels, sublevels, and orbitals for the electrons in an atom.
- Draw the orbital diagram and write the electron configuration for an element.
- Use the electron configurations of elements to explain the trends in periodic properties.

#### *Chapter 5 Nuclear Chemistry*

- Demonstrate the ability to think critically and employ critical thinking skills.
- Read and interpret graphs and data.
- Demonstrate an understanding of the impact of science on society.
- Describe alpha, beta, positron, and gamma radiation.
- Write a balanced nuclear equation showing mass numbers and atomic numbers for radioactive decay.
- Describe the detection and measurement of radiation.
- Given the half-life of a radioisotope, calculate the amount of radioisotope remaining after one or more half-lives.
- Describe the process of nuclear fission and fusion.

#### *Chapter 6 Ionic and Molecular Compounds*

- Demonstrate the ability to think critically and employ critical thinking skills.
- Read and interpret graphs and data.
- Demonstrate an understanding of the impact of science on society.
- Describe the electrical charge and location in an atom for a proton, a neutron, and an electron.
- Write the name and formula for a compound containing a polyatomic ion.
- Given the formula of a covalent compound, write its correct name; given the name of a covalent compound, write its formula.
- Draw the electron-dot formulas for covalent compounds, including multiple bonds and resonance structures.
- Use electronegativity to determine the polarity of a bond.
- Predict the three-dimensional structure of a molecule and classify it as polar or nonpolar.
- Describe the attractive forces between ions, polar molecules, and nonpolar molecules.

### *Chapter 7 Chemical Reactions and Quantities*

- Demonstrate the ability to think critically and employ critical thinking skills.
- Read and interpret graphs and data.
- Demonstrate an understanding of the impact of science on society.
- Use conversion factors to change from one unit to another.
- Identify a reaction as a combination, decomposition, single replacement, double replacement, or combustion.
- Define the terms oxidation and reduction; identify the reactant that is oxidized and the reactant that is reduced along with the oxidizing agent and the reducing agent.
- Use Avogadro's number to determine the number of particles in a given amount of moles.
- Calculate the molar mass of a substance and use the molar mass to convert between grams and moles.
- Given a quantity in moles of reactant or product, use a mole-mole factor from the balanced equation to calculate the moles of another substance in the reaction.
- Given the mass in grams of a substance in a reaction, calculate the mass in grams of another substance in the reaction.
- Identify a limiting reactant when given the quantities of two or more reactants; calculate the amount of product formed from the limiting reactant.
- Calculate the percent yield of a reaction given a quantity of starting material.
- Given the heat of reaction, calculate the loss or gain of heat for an exothermic or endothermic reaction.

### *Chapters 8 Gases*

- Demonstrate the ability to think critically and employ critical thinking skills.
- Read and interpret graphs and data.
- Demonstrate an understanding of the impact of science on society.
- Describe the kinetic molecular theory of gases and the properties of gases.
- Use the pressure-volume relationship (Boyle's law) to determine the new pressure or volume when the temperature and amount of gas are constant.
- Use the temperature-volume relationship (Charles's law) to determine the new temperature or volume of gas when the pressure and amount of gas are constant.
- Use the temperature-pressure relationship (Gay-Lussac's law) to determine the new temperature or pressure when the volume and amount of gas are constant.
- Use Avogadro's law to determine the amount or volume of a gas when the pressure and temperature are constant.
- Use the combined gas law to find the new pressure, volume, or temperature of a gas when changes in two of these properties are given and the amount of gas is constant.
- Use the ideal gas law equation to solve for P, V, T, or n of a gas when given three of the four values in the ideal gas law.
- Use Dalton's law of partial pressures to calculate the total pressure of a mixture of gases.
- Adjust calculated answers to give the correct number of significant figures.
- Use the numerical values of prefixes to write a metric equality.
- Write a conversion factor for two units that describe the same quantity.
- Use conversion factors to change from one unit to another.
- Calculate the density or specific gravity of a substance; use the density or specific gravity to calculate the mass or volume of a substance.