Problem Solving in General Chemistry I

The University of Toledo
Department of Chemistry and Biochemistry
CHEM1200, CRN, Sections 1-8

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Office Hours: MTWF 11-12; W 4-5 PM; and by appointment. Talking to students is the best part of my job!
Office Location: Remote through Blackboard – Course Room

Instructor Phone: 419-530-1503
Offered: Spring 2021
Course Website: Blackboard Learn
Class Location: Varies (see your schedule)
Class Day/Time: Varies (see your schedule)
Credit Hours: 4

CATALOG/COURSE DESCRIPTION

Problem solving and skill development for students enrolled in CHEM 1230 who obtained a satisfactory score on the chemistry placement test but need additional assistance in selected topics. May be taken only as P/NC (pass/no credit).

COURSE OVERVIEW

A method of teaching/learning that has been shown both within our university and nation-wide (https://pubs.acs.org/doi/10.1021/ed085p990) to improve student success rates in Science, Technology, Engineering and Math (STEM) courses is "Peer-Led Team Learning (PLTL)" . Here are some findings at UToledo:

- At the end of the course, 75% of students said they would suggest or recommend it to their friends. That sounds like very strong evidence for what the course can do for you.
- At the end of the semester, students who take CHEM 1200 with CHEM1230 indicate a significantly greater confidence in their ability to solve problems in general chemistry than those who do not take CHEM 1200.
- For students with comparable backgrounds, like placement and ACT scores, taking CHEM 1200 with 1230 makes an average difference of one-third of a letter grade, that is, from a C to a C+ or from a C+ to a B-. The course gives you an **EDGE!**

This course supplements CHEM 1230, General Chemistry I. It is hoped that your experiences in this course will help you 1) to improve your understanding of the material from that course and to 2) develop study, problem solving and communication skills valuable in many courses.

STUDENT LEARNING OUTCOMES

Because this is a supplement to General Chemistry I, the outcomes expected for this course are identical to those for General Chemistry I. At the conclusion of the course students will be able to:

1. Demonstrate the use of equations and dimensional analysis to solve problems in chemistry and justify the number of significant figures in the result.
2. Explain the underlying principles for their calculations.
3. Explain fundamental chemical terms and concepts.
4. Convert between atomic level representations, symbols and names of atoms, isotopes, ions and molecules (including Lewis structures and geometric descriptions).

5. Describe the modern model of the atom and explain how it compares to earlier models.
6. Describe and compare bonding in different types of substances.
7. Identify and describe intermolecular forces in given substances, then predict relative physical properties based on intermolecular forces.
8. Qualitatively and quantitatively, describe the behavior of real and ideal gases.
9. Describe the interconnectedness between periodic trends, atomic properties and element reactivity.
10. Predict, complete and balance reactions (double replacement, combustion and single replacement).
11. Describe and calculate work, enthalpy and internal energy changes in reactions and phase changes.
12. Identify and describe societal applications of chemistry.

TEACHING METHODOLOGY

The general format for this course is small group workshop and discussion. During class time, you will solve general chemistry problems with a small group of peers (usually 6-8). A student who has successfully completed General Chemistry I, and who trains weekly on how to facilitate group learning, will guide your group. In addition to acquiring a better understanding of chemistry, students who take CHEM1200 will sharpen problem solving, collaboration and communication skills.

As your instructor, I am here to help. My office hours and location are above**.** We can talk on the phone or meet in a Collaborate room. I will do my best to respond to email within 24 hours. I will also be soliciting frequent feedback regarding your experience in the course to constantly improve your experience.

PREREQUISITES AND COREQUISITES

All students taking CHEM1200 will also be taking CHEM1230.

TEXTS AND ANCILLARY MATERIALS

All problems to be solved during your CHEM1200 session will be made available by Monday at 12:01 AM of the week you meet with your peers. Some weeks you will also be accessing your textbook for CHEM1230.

ACADEMIC POLICIES

The University of Toledo has a number of academic policies intended to promote fairness and equity among students. These are wide ranging and include policies on adding and dropping a course, duel degree requirements, graduation with honors, academic dishonesty, confidentiality of student records and veteran assistance to name just a few. Please use the following URL to read a comprehensive list of academic policies that may pertain to you in this class and throughout your academic journey: http://www.utoledo.edu/policies/academic/undergraduate/. If you have any questions after reading through the policies, let me know.

COURSE EXPECTATIONS

Each week you are expected to:

- Access the materials for the week from Blackboard and have them available to you during the class session.
- Show that you have completed a *brief* pre-class assignment (usually 5-15 min). These assignments

are meant to help assure that all students have reviewed some common background material before attempting the session problem solving.
- Arrive on time, participate, ask questions, and help others.
- Treat others with respect, patience and dignity.
- Check your UToledo email and Blackboard for Course News (consider setting up notifications on your phone!).

Additionally, there are four brief learning analyses, plus three 1-hour quizzes for you to complete during the semester.

OVERVIEW OF COURSE GRADE ASSIGNMENT

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

Course Aspect	Points	Percentage of Total Points
Pre-class assignments (2 pts each x 11)	22	22%
Weekly sessions (5 pts each x 11)	55	55%
Online quizzes (5 pts each x 3)	15	15%
Learning Analysis (2 pts each x 4)	8	8%
TOTAL	**100**	

Midterm Grading: Midterm grades are assigned the 8th week of class and are used to assist students with determining their academic standing. This course is graded on the Pass/No Credit grading system. If you have earned 70% of the available points at that time you will receive a P (pass); otherwise NC (no credit).

Final Grading: If you earn 65 of the 100 possible points in the course you will receive a grade of P (pass). If you earn less than 65 points you will receive a grade of NC (no credit). If you miss a class due to a reason that is consistent with the university's Missed Class Policy, you should immediately contact the instructor in order to request an excused absence. Your goal should be to not miss any classes since each class will help you.

Drop, Withdrawal and Incomplete Grades: Dropped courses do not appear on your transcript. The deadline for dropping is February 2nd. You may withdraw from the course and receive a grade of W. The deadline for withdrawal is March 26th. W's do not affect your GPA but do appear on your transcript. A student, registered for both this course and the laboratory (CHEM1280), who is intending to drop/withdraw from the lecture course by mid-semester (in first 8 weeks) must also drop/withdraw the associated lab course.

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 embraces the inclusion of students with disabilities. We are committed to ensuring equal opportunity and seamless access for full participation in all courses. For students who have an accommodations memo from Student Disability Services, I invite you to correspond with me as soon as possible so that we can communicate confidentially about implementing accommodations in this course. For students who have not established affiliation with Student Disability Services and are experiencing disability access barriers or are interested in a referral to healthcare resources for a potential disability or would like information regarding eligibility for academic accommodations, please contact the Student Disability Services Office (http://www.utoledo.edu/offices/student-disability-services/) by calling 419.530.4981 or sending an email to StudentDisability@utoledo.edu.

Additional Policy Statements

Students can find other university policies listed by audience on the University Policy webpage (http://www.utoledo.edu/policies/audience.html/#students).

ACADEMIC AND SUPPORT SERVICES

The university provides a variety of academic and support services on campus to help you succeed and reach your fullest potential. Whether you need to ask a question, get help with an assignment, seek advice from a counselor, find a job or join a club, UToledo is there for you! You may contact me, or use the following resources to find the academic support or service you need:

Chemistry Help from Teaching Assistants: Virtual/online help will be available. The link for the Help Center is
https://us.bbcollab.com/guest/ce2a41f345ed4e9d939dd6e7b0ef0c63
You will receive a schedule from your CHEM1230 instructor early in the term. No appointment is necessary!

Tutoring through the Learning Enhancement Center located in the Carlson Library is available for all students in a variety of courses, including chemistry***:*** http://www.utoledo.edu/success/lec/

Success Coaching: https://www.utoledo.edu/successcoach/

Student Affairs: http://www.utoledo.edu/studentaffairs/

Office of Student Advocacy: https://www.utoledo.edu/studentaffairs/student-advocacy/ (help with the non-academic challenges)

Library: http://www.utoledo.edu/library/

Career Services: http://www.utoledo.edu/success/career/

Course scheduling assistance*:* the Chemistry Department Secretary, Ms. Samples can assist you with scheduling changes for chemistry courses (Room BO2022; email: pamela.samples@utoledo.edu ; phone: 419-530-2698).

SAFETY AND HEALTH SERVICES FOR UTOLEDO STUDENTS

Please use the following link to view a comprehensive list Campus Health and Safety Services available to you as a student.

SPECIAL COURSE EXPECTATIONS DURING COVID-19

This is an unprecedented time for our Rockets community at the University of Toledo. In times of challenge, such as this, we come together to support each other and help keep the more vulnerable members of our community safe during the COVID-19 pandemic. If we all do our part, we will help to minimize the spread of infection and maintain engaging face to face class environments this spring. That is why we are asking all faculty, staff and students to adhere to the special course expectations described below. Please review these policies described below.

Face-to-face Attendance: In order to ensure that we self-quarantine if symptomatic, students, faculty and staff must perform a daily health assessment, based on based on **CDC guidelines,** before coming to campus each day, which includes taking your temperature. Students who are symptomatic/sick should not come to class and should contact the Main Campus Health Center at 419-530-3451. The University of Toledo has a missed class policy. It is important that you understand the attendance requirements for this course. Please engage with me if you have any questions about these requirements. *Absences due to COVID-19 quarantine or isolation requirements **are** considered excused absences **from face to face classes***. You should notify me if you are in quarantine or isolation and these absences may not require written notice.

Face Coverings: To help keep each other safe, everyone must wear face coverings 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 that prevents you from wearing a face covering due to a health condition deemed high-risk for COVID-19 by the Centers for Disease Control and Prevention (CDC), you should submit a request for accommodation through the Student Disability Services Office (SDS) by completing this online application. You will need to provide documentation that verifies your health condition or disability and supports the need for accommodations. If you are already affiliated with SDS and would like to request additional accommodations due to the impact of COVID-19, please contact their accessibility specialist to discuss your specific needs.

Social Distancing: As further efforts to keep everyone safe, students should practice social distancing inside and outside the classroom, including when you enter and exit. Please maintain at least 6 feet of distance between yourself and others, follow posted signage, and pay attention to the seating arrangements in the classroom. It's important that you do not remove stickers or tape from seats and/or tables, as they are there to provide guidance on the appropriate classroom capacity based on recommended social distancing between individuals. Please be conscious of your personal space and respectful of the space of others in the class.

Desks and Workspaces: An important part of keeping our classroom spaces safe involves keeping them sanitized. We ask all students to sanitize their desk and/or workspace before class begins, with the sanitizing spray and paper towels provided in the classroom.

Special Note: Although there is a rigorous and evidence-based plan for keeping each other safe during COVID-19, it's important to note that, based on the unpredictability of the virus, things can change at any time. So, please be patient and understanding as we move through the semester. If at any point you have any concerns about class, completing course work/assignments, and/or health concerns related to COVID, let me know.

Please also know that we recognize the COVID-19 situation has placed additional burdens on many of our students. If, at any point in the semester, you experience difficulties meeting your basic needs, managing your different responsibilities, or maintaining your physical or mental health, we have a variety of resources that can help. Review and utilize our Student Success resources and contact me if you have any questions.

COURSE SCHEDULE

A summary of the weekly assignments and anticipated course schedule is provided below. Note the Quiz dates. As instructor, I reserve the right to modify the schedule of topics if I believe it to be in the best interest of the class, however, Quiz and Survey dates will NOT change.

WEEK	Class Meeting Date	CHEM1200 Topics[1]	SLOs	Assignments[2]
1	Jan 21	No Pre-Class Assignment Short meeting during scheduled time. Use Collaborate Ultra on Blackboard to join your class.		**Learning Analysis 1** due Sunday, Jan. 24 at 11:59 PM
2	Jan 28	3.1 Molecular and Formula Mass 3.2 Percent Composition 3.3 Balancing Equations 3.4 The Mole, Grams and Numbers of Things, Empirical Formula	1,2,3,4, 10	Week 2 Pre-class Assignment (found on Blackboard)
3	Feb 4	3.5 Combustion Analysis and Molecular Formula 3.6 Reaction Stoichiometry 3.7 Limiting Reagents, Reaction Yield and Types of Reactions	1,2,3,4, 10,12	Week 3 Pre-class Assignment **Learning Analysis 2** due Sunday, Feb 7 at 11:59 PM
4	Feb 11	4.1 Solutions and Electrolytes 4.2 Precipitation Reactions 4.3 Acid-Base Reactions	1,2,3,4, 10,12	Week 4 Pre-class Assignment
5	Feb 18	4.4 Redox Reactions, Oxidation Numbers and Activity Series 4.5 Molarity, Dilution, Solution Stoichiometry Prepare for Exam 1	1,2,3,4, 10,12	Week 5 Pre-class Assignment
6	Feb 25	No Meeting – Exam 1 in CHEM 1230 is Wednesday of this week.		**Quiz 1** Due Sunday, Feb 21 at 11:59 PM

[1] The numbers refer to chapters and sections in the CHEM1230 textbook. **Unfortunately, there is not enough time in CHEM1200 to cover ALL of the CHEM1230 topics, but we hit a lot!**

[2] Each week you will come to class with a completed Pre-Class Assignment for the WEEK (see Blackboard – "Weekly Assignments" link) and a copy of the problems you will work on during your session.

7	Mar 4	5.1 Enthalpy and enthalpy changes 5.2 State Functions Heat and Work 5.3 Enthalpy and Enthalpy Changes 5.4 Specific Heat and Calorimetry 5.5 Hess's Law 5.6 Standard Enthalpies of Formation	1,2,3,4, 10,11,12	Week 7 Pre-class Assignment **Learning Analysis 3** due Sunday, Mar 7 at 11:59 PM
8	Mar 11	6.1 The Nature of Light 6.2 Quantum Theory and the Photoelectric Effect 6.3 The Bohr Model 6.5 Quantum Mechanics 6.6 Quantum Numbers	1,2,3,4,5 6,12	Week 8 Pre-class Assignment
9	Mar 18	7.3 Effective Nuclear Charge 7.4 Periodic Trends (Radii, Electron Affinity and Ionization Energy) 7.5 Electron Configurations of Ions 7.6 Ionic Radii	3,4,5,9	Week 9 Pre-class Assignment
10	Mar 25	8.1 Covalent Bonding in Molecules 8.2 Ionic Bonding 8.3 Covalent Bonding 8.4 Bond Polarity 8.5 Lewis Dot Structure	3,4,6	Week 10 Pre-class Assignment
11	Apr 1	9.1 Molecular Geometry 9.2 Molecule Polarity 9.3 Valence Bond Theory (VBT) 9.4 Hybridization 9.5 VBT: Double and Triple bonds 9.6 Molecular Orbital Theory 9.7 Delocalized Bonding	3,4,6	Week 11 Pre-class Assignment **Quiz 2** Due Sunday, Apr 4 at 11:59 PM
12	Apr 8	No Meeting Exam 2 in CHEM 1230 is Monday of this week.		
13	Apr 15	11.1 Intermolecular Forces 10.1 Properties of Gases 10.2 Gas laws	3,4,6	Week 13 Pre-class Assignment
14	Apr 22	10.3 The Ideal Gas Law 10.4 Reactions with Gases 10.5 Partial Pressures 10.6 Kinetic Molecular Theory	1,2,3,8	Week 14 Pre-class Assignment **Learning Analysis** Due Sunday, Apr 25 at 11:59 PM

15	Apr 29	**No Classes**		**Quiz 3** Due Sunday, May 2 at 11:59 PM
Finals Week	May 3-7	No Meeting. No Final in CHEM 1200! ***We hope your time in CHEM1200 pays off as you demonstrate your learning on the CHEM1230 Final!!***		