



## General Chemistry II

The University of Toledo  
College of Natural Sciences and Mathematics  
Department of Chemistry and Biochemistry  
CHEM1240 24174 (section 013) and 24177 (section 091)

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<b>Instructor:</b>	Claire Cohen	<b>Office Location:</b>	Virtual/Blackboard Collaborate
<b>Email:</b>	claire.cohen@utoledo.edu	<b>Instructor Phone:</b>	4195304071
<b>Office Hours:</b>	<u>Mondays and Wednesdays:</u> 9:30am-10am, 2:00pm-2:30pm, 7:00pm – 7:30pm <u>Fridays:</u> 9:30am-10am, 2:00pm-2:30pm	<b>Offered:</b>	Spring, 2021
		<b>Course Website:</b>	<a href="https://blackboard.utdl.edu/webapps/login/">Blackboard Learn</a> or <a href="https://blackboard.utdl.edu/webapps/login/">https://blackboard.utdl.edu/webapps/login/</a>
		<b>Class Location:</b>	Remote/Blackboard Collaborate
		<b>Class Day/Time:</b>	MWF 1:00pm-1:55pm
		<b>Credit Hours:</b>	4

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### CATALOG/COURSE DESCRIPTION

An introduction to solutions, equilibrium, acid-base theory, energy relationships and structural concepts. This sequence is for students who major in science, engineering or other fields which require chemistry as a prerequisite subject. Three hours lecture and one hour discussion per week.

### COURSE OVERVIEW

CHEM1240 is the second course in the General Chemistry sequence. CHEM 1290 is the appropriate lab course to go with CHEM 1240. This sequence is intended for majors in the natural sciences, science education, pharmacy, chemical engineering or bioengineering, and allied health fields.

### PREREQUISITES AND COREQUISITES

CHEM 1230 with a minimum grade of C is a prerequisite for CHEM1240.

### TEXTS AND ANCILLARY MATERIALS

- From the Blackboard course site <https://blackboard.utdl.edu/webapps/login/> you will access:
  - An electronic copy of the textbook, *Chemistry* by Julia Burge 5<sup>th</sup> edition
  - Connect online homework assignments
- A non-programmable calculator. Only non-programmable calculators are allowed when you take exams in this course.
- **Optional:** A hard copy of *Chemistry* by Julia Burge 5<sup>th</sup> edition (3-ring hole-punch version is available in the bookstore).

### TEACHING METHODOLOGY

**Lecture:** You are expected to attend the live streamed lecture at our regularly scheduled class time. If you have an excusable conflict, the recording of the lecture will be available for you to view at a different time. Take active notes with the provided lecture outline for each lecture.

**Participation points:** You will have a set of participation questions to complete on Blackboard due each week Friday before 11:59pm (if for any reason the material is not covered before this day/time your instructor may opt to push



back a deadline as needed). You are welcome to use your notes and textbook to complete these questions. You have unlimited attempts, untimed, before each posted deadline and your highest score will be recorded for credit. Each question is worth 0.25 points (There are also exam review questions worth 0.1 point each). There will be several extra points available overall.

**Textbook** We urge you to read the text before the lecture so you are familiar with concepts before hearing about them during the limited time of each class session.

**Online Homework** will be assigned each week in the form of an online assignment using the program Connect. You are required to attempt the weekly Connect assignment to the best of your ability before your scheduled recitation section. Selected problems from the assigned homework will be discussed in recitation each week. You will then complete the Connect assignment before the deadline each week of Sunday 11:59pm.

**Recitation:** Everyone is registered for a weekly recitation period. You are required to attend recitation each week. You are expected to show your TA your first attempt on the Connect assignment for the given week. Each recitation is worth 4 points including both attendance and an attempt on the Connect online homework. Please note the special university wide course expectations during COVID-19 listed on page 10 of the syllabus.

## COMMUNICATION GUIDELINES

As your instructor, I am here to help, and will do my best to respond to email within 24 to 48 hours. Students are expected to check their UT email account and Blackboard frequently for important course information. We want you to be successful in this course, so let's work together!

## TECHNOLOGY REQUIREMENTS, SKILLS, AND PRIVACY POLICIES

Please view the [technology considerations](#) for this course, including technical skills needed, general technology requirements, and technology privacy policies.

## TECHNOLOGY REQUIREMENTS FOR EXAMS

### **LockDown Browser + Webcam Requirement**

This course requires the use of LockDown Browser and a webcam for online exams. The webcam can be the type that's built into your computer or one that plugs in with a USB cable.

Watch this brief video to get a basic understanding of LockDown Browser and the webcam feature.

<https://www.respondus.com/products/lockdown-browser/student-movie.shtml>

### **Download Instructions**

Download and install LockDown Browser from this link:

<https://download.respondus.com/lockdown/download.php?id=213815819>

If you have any issues with the Webcam requirement please contact your instructor asap to arrange for alternate proctoring arrangements for the exams.

## GENERAL TECHNOLOGY REQUIREMENTS

Students need to have access to a properly functioning computer throughout the semester. The Browser Check Page <http://www.utoledo.edu/dl/helpdesk/browser-check.html> will enable you to perform a systems check on your



browser, and to ensure that your browser settings are compatible with Blackboard, the learning management system that hosts this course.

Software 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.

This course does contain streaming audio and video content.

Use of Public Computers: If using a public library or other public access computer, please check to ensure that you will have access for the length of time required to complete tasks and tests. A list and schedule for on-campus computer labs is available on the Open Lab for Students webpage.

UT Virtual Labs: Traditionally, on-campus labs have offered students the use of computer hardware and software they might not otherwise have access to. With UT's Virtual Lab, students can now access virtual machines loaded with all of the software they need to be successful using nothing more than a broadband Internet connection and a web browser. The virtual lab is open 24/7 and 365 days a year at VLAB: The University of Toledo's Virtual Labs.

Learner Technical Support can be found here <http://www.utoledo.edu/dl/students/learnersupport.html>

## **ACCESSIBILITY OF COURSE TECHNOLOGIES**

Please view [Accessibility of Course Technologies](#) for information regarding the accessibility of Blackboard and other technologies used in this course.

## **COURSE EXPECTATIONS**

1. Read the textbook before the lecture, the schedule is listed below.
2. Attendance is required for the live streamed lectures. Take active notes using the provide lecture outlines.
3. Attendance is required for recitation classes. Bring your first attempt on Connect to your recitation class. Each recitation session is worth 4 WA points: 2 for attendance and 2 for an attempt on Connect. **No credit is given unless you attend the entire recitation session.**
4. You are responsible for all material and problems covered in class. Complete the participation questions on Blackboard before the Friday 11:59pm deadline each week.
5. Complete the online homework assignment Connect before the 11:59pm deadline each week.
6. If you need extra help, see your instructor virtually during office hours or use email. Seek help in the virtual **LEC**, virtual **Chemistry Help Center**, and/or attend virtual **Supplemental Instruction (SI)** sessions.

## **OVERVIEW OF COURSE GRADE ASSIGNMENT**

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

Midterm Exams 3 @ 100 points each	300 pts
Final Exam	200 pts
Connect Homework (online)	100 pts
Participation: polling, recitation, writing assignments	100 pts
Practice Exam	<u>5 pts</u>
Total	705 pts



**Grade Scale** These are the minimum percentages of total points needed to receive the indicated grade.

	A	90%	A-	86%
B+	B	78%	B-	74%
C+	C	66%	C-	62%
D+	D	54%	D-	50%

**Drop, Withdrawal and Incomplete Grades** Course drop and withdrawal procedures have been set by the University. **Dropped** courses do not appear on your transcript. The deadline for dropping is February 2<sup>nd</sup>. You may **withdraw** from the course and receive a grade of W. The deadline for withdrawal is March 26<sup>th</sup>. **W's do not affect your GPA.**

*Note: A student, registered for both a lecture course and an associated concurrent laboratory, who is intending to drop/withdrawal from the lecture course by mid-semester (in first 8 weeks) must also drop the associated lab course. A student withdrawing from the lecture during the last weeks of allowed withdrawal (weeks 9-10) may be allowed to finish the lab course if they have a grade of C or better in the lab and permission of the lab instructor. The student would be required to complete the required paperwork for the registrar and obtain the signature of the faculty member in charge of the laboratory (to certify they meet the criteria above). The student will take the signed form to the registrar.*

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 organic chemistry.

#### **Midterm Grading**

A midterm grade should be taken seriously with respect to how well you are doing in the course approximately half-way through the semester. Midterm grades will be calculated based on the score on Exam 1 and up-to-date participation points and will use the grade scale as listed above.

#### **Final Grading**

The course points and grade scale as listed above will be used to assign final grades.

### **ACADEMIC POLICIES**

**Examinations** *Make-up exams will not be given.* 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. You cannot share a calculator.

*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. 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 extreme circumstances such as severe illness, car accident or similar **extreme** circumstance should inform their instructor *ASAP*. **Documentation** such as a physician's note, an accident report, etc is required. An email to the instructor within 24 hours is expected. In all other cases a missed exam will result in 0 on the exam. In the event documentation is not readily obtained, students may work with the Office of Student Advocacy and Support to obtain an excusable absence.



<https://www.utoledo.edu/studentaffairs/student-advocacy/>

**Academic Dishonesty:** Refer to the university's policy on Academic Dishonesty in the university catalogue and the Academic Honesty Statement that you will sign electronically as a part of your practice exam. Violation of this policy can result in a course grade of F with additional university sanctions possible.

Undergraduate Policies: <http://www.utoledo.edu/policies/academic/undergraduate/>

Graduate Policies: <http://www.utoledo.edu/policies/academic/graduate/>

## 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](#).

Students can find this policy along with other university policies listed by audience on the [University Policy webpage](#) (<http://www.utoledo.edu/policies/audience.html/#students>).

### **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](mailto:StudentDisability@utoledo.edu).

## ACADEMIC AND SUPPORT SERVICES

Please follow this link to view a comprehensive list of [Student Academic and Support Services](#) (<http://www.utoledo.edu/studentaffairs/departments.html>) available to you as a student

**Course scheduling assistance:** Chemistry Department Secretary, Ms. Samples, is in Room BO 2022, telephone 419-530-2698. She takes care of all scheduling changes.

**Chemistry Help Center, Virtual/Online**, is where the teaching assistants hold their office hours so it is a great place to receive assistance. A schedule will be posted early in the term. No appointment is necessary.

**Tutoring support. Virtual/Online** for all UT students is available through the **Learning Enhancement Center** located in the Carlson Library.

**Instructor Office Hours Virtual/Online** are times when you can join Blackboard Collaborate Ultra (no appointment needed) with questions about the course material. My office hour times are listed at the top of the syllabus.

## SAFETY AND HEALTH SERVICES FOR UT STUDENTS

Please use the following link to view a comprehensive list [Campus Health and Safety Services](#) available to you as a student

## COURSE SCHEDULE

WEEK	DATES	TOPIC	LEARNING OUTCOMES (Listed on p.9)	ASSIGNMENTS DUE
1	1/19 – 1/22	Ch 11: IMF and the Physical Properties of Liquids and Solids	1, 2	<b>Week 1 Participation Questions:</b> Due Friday, 1/22, 11:59pm  <b>Connect Homework 1 (Ch 11A):</b> Due Sunday, 1/24, 11:59pm
2	1/25 – 1/29	Ch 11: continued Ch 13: Physical Properties of Solutions	3, 4, 5	<b>Week 2 Participation Questions:</b> Due Friday, 1/29, 11:59pm  <b>Practice Exam (with Respondus Lockdown Browser):</b> Due Friday, 1/29, 11:59pm  <b>Connect Homework 2 (Ch 11B):</b> First attempt due at recitation. Final attempt due Sunday, 1/31, 11:59pm
3	2/1 – 2/5	Ch 13: continued	6	<b>Week 3 Participation Questions:</b> Due Friday, 2/5, 11:59pm  <b>Connect Homework 3 (Ch 13A):</b> First attempt due at recitation. Final attempt due Sunday, 2/7, 11:59pm
4	2/8 – 2/12	Ch 13: continued Ch 14: Chemical Kinetics	7, 8	<b>Week 4 Participation Questions:</b> Due Friday, 2/12, 11:59pm  <b>Exam 1</b> , Friday, 2/12, in Lecture (Chapters 11, 13, 14 (partial))  <b>Connect Homework 4 (Ch13B/14A):</b> First attempt due at recitation. Final attempt due Sunday, 2/14, 11:59pm
5	2/15 – 2/19	Ch 14: continued	9, 10	Note: (no classes on 2/16)  <b>Week 5 Participation Questions:</b> Due Friday, 2/19, 11:59pm  <b>Connect Homework 5 (Ch14B)</b> First attempt due at recitation. Final attempt due Sunday, 2/21, 11:59pm
6	2/22 – 2/26	Ch 14: continued Ch 15: Chemical Equilibrium	11, 12, 13	<b>Week 6 Participation Questions:</b> Due Friday, 2/26, 11:59pm  <b>Connect Homework 6 (Ch15A):</b> First attempt due at recitation. Final attempt due Sunday, 2/28, 11:59pm

WEEK	DATES	TOPIC	LEARNING OUTCOMES (Listed on p.9)	ASSIGNMENTS DUE
7	3/1 – 3/5	Ch 15: continued Ch 16: Acids and Bases	14, 15	<b>Week 7 Participation Questions:</b> Due Friday, 3/5, 11:59pm  <b>Connect Homework 7 (Ch15B):</b> First attempt due at recitation. Final attempt due Sunday, 3/7, 11:59pm
8	3/8, 3/12	Ch 16: continued		Note: (no class on 3/10)  <b>Week 8 Participation Questions:</b> Due Friday, 3/12, 11:59pm  <b>Connect Homework 8 (Ch16A):</b> First attempt due at recitation. Final attempt due Sunday, 3/14, 11:59pm
9	3/15 – 3/19	Ch 16: continued Ch 17: Acid-Base Equilibria and Solubility Equilibria	16, 17, 18	<b>Week 9 Participation Questions:</b> Due Friday, 3/19, 11:59pm  <b>Connect Homework 9 (Ch16B):</b> First attempt due at recitation. Final attempt due Sunday, 3/21, 11:59pm
10	3/22 – 3/26	Ch 17: continued	19	<b>Week 10 Participation Questions:</b> Due Friday, 3/26, 11:59pm  <b>Exam 2</b> , Friday, 3/26, In Lecture (Ch 14 (partial), 15, 16, 17 (partial), and review of Exam 1)  <b>Connect Homework 10 (Ch17A):</b> First attempt due at recitation. Final attempt due Sunday, 3/28, 11:59pm
11	3/29 – 4/2	Ch 17: continued	20, 21	Note: (no class on 3/29)  <b>Week 11: Participation Questions:</b> Due Friday, 4/2, 11:59pm  <b>Connect Homework 11 (Ch17B):</b> First attempt due at recitation. Final attempt due Sunday, 4/4, 11:59pm
12	4/5 – 4/9	Ch 17: continued Ch 18: Entropy, Free Energy, and Equilibrium	22, 23	<b>Week 12 Participation Questions:</b> Due Friday, 4/9, 11:59pm  <b>Connect Homework 12 (18A):</b> First attempt due at recitation. Final attempt due Sunday, 4/11, 11:59pm

WEEK	DATES	TOPIC	LEARNING OUTCOMES (Listed on p.9)	ASSIGNMENTS DUE
13	4/12 – 4/16	Ch 18: continued Ch 19: Electrochemistry	24, 25	<b>Week 13 Participation Questions:</b> Due Friday, 4/16, 11:59pm  <b>Connect Homework 13 (18B/19A):</b> First attempt due at recitation. Final attempt due Sunday, 4/18, 11:59pm
14	4/19 – 4/23	Ch 19: continued	26, 27	<b>Week 14 Participation Questions:</b> Due Friday, 4/23, 11:59pm  <b>Exam 3</b> , Friday, 4/23, In Lecture (Chapters 17 (partial), 18, 19 (partial), and review of Exams 1 and 2)  <b>Connect Homework 14 (19B):</b> First attempt due at recitation. Final attempt due Sunday, 4/25, 11:59pm
15	4/26 – 4/30	Ch 19: continued	28, 29, 30	Note: (no classes on 4/29 – 4/30)  <b>Week 15 Participation Questions:</b> Due Friday, 4/28, 11:59pm  <b>Connect Homework 15 (19C):</b> Only the final attempt is due. Sunday, 5/2, 11:59pm
Finals Week 5/3 – 5/7				<b>Final Exam:</b> Wednesday, 5/5, 8:00am – 10:00am Chapters 11, 13 – 19





**STUDENT LEARNING OUTCOMES** Upon completion of this course, students will be able to:

1. Predict the properties of substances based on structure.
2. Apply the Clausius–Clapeyron equation to solve for thermodynamic quantities.
3. Create and interpret heat curves and phase diagrams.
4. Identify the arrangements in crystalline solids and cubic unit cells.
5. Solve for the concentration of a solution and convert between units.
6. Use and Apply colligative properties of solutions and calculate the molar mass of an unknown.
7. Use integrated rate laws for zeroth, first, and second-order reactions.
8. Determine the reaction order using rate-laws, integrated rate laws, graphs, and half-lives.
9. Solve for rate constants and activation energy using the Arrhenius equation.
10. Interpret reaction mechanisms including potential energy diagrams.
11. Describe characteristics of a reaction in chemical equilibrium.
12. Solve for the values of equilibrium constants including heterogeneous and homogeneous equilibria and evaluate the extent of reaction.
13. Solve for concentrations or partial pressures of products and reactants in equilibrium.
14. Predict the direction a reaction in equilibrium will shift as a result of added stresses.
15. Identify Arrhenius and Brønsted–Lowry acids and bases including conjugate acid–base pairs.
16. Predict the relative strengths of acids and bases based on chemical structure.
17. Solve for  $[\text{H}_3\text{O}^+]$  and  $[\text{OH}^-]$ , pH, percent dissociation,  $K_a$ ,  $\text{p}K_a$ ,  $\text{p}K_b$ , for various aqueous solutions.
18. Relate  $K_a$ ,  $K_b$ ,  $\text{p}K_a$ , and  $\text{p}K_b$  for a conjugate acid–base pair.
19. Identify Lewis acids and bases.
20. Solve for the pH of buffer solutions and the change in pH on addition of a strong acid or a strong base.
21. Solve for the pH at various points in a titration and interpret titration curves.
22. Solve for the solubility of a compound in water including acidic and basic solutions and those with a common ion.
23. Define a spontaneous process and classify various physical processes and chemical reactions as spontaneous or nonspontaneous.
24. Solve for values of  $\Delta S_{\text{sys}}$ ,  $\Delta S_{\text{surr}}$ ,  $\Delta S_{\text{total}}$ ,  $K$ , and  $\Delta G$ , and determine if a reaction is spontaneous.
25. Interpret a galvanic cell including shorthand notation and write balanced equations for the electrode and overall cell reactions.
26. Solve for the cell potential under standard and nonstandard-state conditions using the Nernst equation.
27. Use cell potentials to calculate the equilibrium constant and the standard free-energy changes.
28. Describe batteries, fuel cells, corrosion, and electrolytic cells.
29. Relate the current, time, and amount of product produced in an electrolytic or galvanic cell.
30. Identify the oxidation states of metals in coordination complexes and classify donor atoms, ligands and isomers.



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

### **RECITATION ATTENDANCE**

The University of Toledo has a missed class policy. It is important that students and instructors discuss attendance requirements for the course (see COURSE EXPECTATIONS section below). Students must perform a daily health assessment, based on based on CDC guidelines, before coming to campus each day, which included taking their temperature. Students who are symptomatic/sick should not come to class and should contact the Main Campus Health Center at 419-530-3451. Absences due to COVID-19 quarantine or isolation requirements are considered excused absences **from face-to-face recitation**. Students should notify their instructors and these absences may not require written notice.

### **FACE COVERINGS**

All students must wear face coverings while on campus, except while eating, alone in an enclosed space, or outdoors practicing social distancing. NO students will 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 an accommodation through the Student Disability Services Office (SDS) by completing the online application. Students will need to provide documentation that verifies their health condition or disability and supports the need for accommodations. If a student is already affiliated with SDS and would like to request additional accommodations due to the impact of COVID-19, should contact their accessibility specialist to discuss their specific needs.

### **SOCIAL DISTANCING**

Students should practice social distancing inside and outside the classroom please follow signage and pay attention to the seating arrangements. Do not remove stickers or tape from seats and/or tables, this is there to provide guidance on the appropriate classroom capacity based on the recommended 6 feet of social distancing between individuals. Please be conscious of your personal space and respectful of others. Also be cognizant of how you enter and exit the room; always try to maintain at least 6 feet of distance between yourself and others.

### **DESKS AND WORK SPACES**

Students will need to sanitize their desks and/or work space before class with the University provided sanitizing spray and paper towels their desks.

### **OTHER 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 patience 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.