

**SYLLABUS - CHEM 171, PRINCIPLES OF CHEMISTRY, FALL 2020****Instructor:** Prof. Kristin K. Kumashiro**Email:** kumashir@hawaii.edu**Office:** Bilger 241**Phone:** 956-5733 (campus office)**Regular Class Meeting Times:** Mondays, 3:30-4:20 p.m. HST, and  
Tuesdays & Thursdays, 12:00-1:15 p.m. HST

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**GENERAL COURSE INFORMATION****PREREQUISITES:** Satisfactory Placement Exam score, and  
MATH 241 (or concurrent) or MATH 251A (or concurrent)**OTHER IMPORTANT REGISTRATION & PROGRAM NOTES:**

- Check with your academic advisors to confirm the minimum grade for your desired degree.
- Your degree program will count *either* CHEM 161-162 *or* 171 (not both!) towards fulfilling your requirements.
- For those who will need CHEM 272, please note that its prerequisite is a C (not C-minus) or better in CHEM 162 or 171.
- This 1-semester course does not usually meet the requirements for a year of General Chemistry, which is typically required for the professional schools (e.g., medical school).

**GRADING SCHEME & TENTATIVE EXAM SCHEDULE (REVISED):**

Exam I (Tuesday, September 15, 2020)	15%
Exam II (Tuesday, October 13, 2020)	20%
Exam III (Tuesday, November 17, 2020)	20%
Exam IV (Thursday, December 17, 2020, 12:00 p.m. (noon))	15%
In-class activities & participation	20%
<u>Homework</u>	<u>10%</u>
	<b>100%</b>

## TECHNOLOGY FOR CHEM 171 IN FALL 2020

### TEXTBOOK & ONLINE HOMEWORK:

- Text for this class is **General Chemistry: Principles & Modern Applications, 11<sup>th</sup> Edition**.  
Authors: Petrucci, Herring, Madura, Bissonnette. (Publisher: Pearson)
- Online course material includes your textbook (as e-Book) and the homework (through Mastering). Our Mastering Chemistry course name is [REDACTED].
- You will access course material digitally via the UH Bookstore's Interactive Digital Access Program (IDAP). **See posted information at Laulima for details.**
- You have the option to opt-out of receiving your course material through IDAP. By opting-out, you will lose access to the course material and the charge will be refunded on your MyUH account. If you do not opt-out, the charge will stay on your MyUH account. Any unpaid charges on your MyUH account will turn into a hold. Holds on your account will prevent you from accessing various services within the University. You may opt-out by visiting your unique Inclusive Access Student Portal, which can be found in your IDAP welcome email (Subject Line: *"IMPORTANT: You have enrolled in an IDAP Course"*). For more information regarding IDAP, please contact the UH bookstore.
- Note that a small portion of your grade comes from homework, and there is/will be no alternate mechanism for submitting homework, if you opt-out of the Mastering platform.

### ZOOM MEETING INFORMATION:

- All class meetings will be held on the Zoom platform.
- You received the Zoom invitation for the semester before the start of classes. A copy of the invitation is also posted to Laulima.
- Our class meetings are set up as "recurring", so you will see a 5-hour window for Monday, Tuesday, and Thursday afternoons. Of course, class is held only at the above times.
- Your attendance is expected at all class meetings on Zoom, unless otherwise advised.
- The lectures will be recorded and then posted to Laulima. If the chat is used, a copy of the transcript will also be posted.
- **Meeting ID:** [REDACTED]  
**Passcode:** [REDACTED]

### SOCRATIVE FOR IN-CLASS ACTIVITIES

- Start by taking a look at the Socrative website (<https://www.socrative.com/>).
- Socrative Student is available as a (FREE) downloadable app in iOS, Chrome, and Google Play formats. (Use the student version, not the one for teachers.)
- You can also work directly in your favorite browser (<https://www.socrative.com/apps/#login>).
- Be ready to use Socrative for various types of in-class assessment. Your participation in the Socrative "quizzes" will count towards the "In-class activities" portion of your grade.

## **SLACK FOR OUT-OF-CLASS DISCUSSION AND QUESTIONS**

- We are using the free version of Slack (<https://slack.com/>), which is supported on a number of platforms. You can also use Slack in your favorite browser (I usually use Chrome).
- Please use the Slack channels to ask questions, instead of Laulima or even email. Slack will allow everyone to see your questions & answers (from me or others), relevant discussion, etc,
- You are all welcome to send DMs to me via Slack.
- The Slack workspace [REDACTED] is the group that includes all of us (all registered students and me). The Slack channels are akin to threads, and each is denoted with the hashtag.
- Use this link to join our Slack workspace:

[REDACTED]

- The above link will expire on or about September 16, 2020. Please contact me for an updated invitation, if it expires before you are able to join.
- Please always remember that another person will read what you write – and we all want to help each other learn this most excellent material – so, write your messages with care and courtesy, and please treat each other in the respectful manner that you would use, if we were meeting in person.

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## **STUDENT LEARNING OUTCOMES**

Student Learning Outcomes (SLO's) for General Chemistry are listed at the UHM Chemistry website, as follows:

*“Upon completion, the student should understand:*

1. *The basic structures of atoms, ions, and molecules, and ways to quantitatively describe the properties of atoms and molecules in the various phases of pure matter and in mixtures.*
2. *The reactivity of atoms, ions, and molecules, and the various qualitative and quantitative methods for describing or depicting chemical reactions.*
3. *The concept of chemical equilibrium, and the energies that drive chemical reactions: an introduction to the field of thermodynamics.*
4. *The concept of chemical kinetics and the energy required to initiate a chemical reaction.*
5. *The relationship between the electronic configurations of atoms and molecules and their chemical properties: an introduction to the field of quantum mechanics.”*

In CHEM 171, this material will also be complemented by examples of particular interest to students who are either pre-engineering or physical science majors. Thus, an additional SLO is:

6. Upon completion, the student should be able to cite numerous examples of the applications of these chemical concepts to problems in engineering and the physical sciences.

## SCHEDULE OF TOPICS & TENTATIVE EXAM SCHEDULE

### **WEEKS 1-2 WELCOME TO CHEM 171; THERMOCHEMISTRY (CH. 7)**

CHEM 171 begins with an introduction to thermochemistry. We will cover heat, work, and enthalpy. We will also cover the standard heats of formation and Hess's Law.

### **WEEKS 2-4 ATOMIC STRUCTURE (CH. 8) & PERIODIC TRENDS (CH. 9)**

Next, we will look at atomic structure, focusing on the foundations provided by quantum mechanics. Then, we will use our basic understanding of atoms to explain and predict reactivity and various physical properties.

### **EXAM 1 TUESDAY, SEPTEMBER 15, 2020 (15%)**

### **WEEKS 4-5 MOLECULAR STRUCTURE (CH. 10-11)**

The description of molecules is covered over two chapters. We make use of the idea of valence electrons (of atoms) to draw structures on paper, as in Lewis theory. Key concepts include electronegativity and ionic vs. covalent bonds. In Ch. 11, the representations move from 2D to 3D, with the use of VSEPR theory. An alternate picture with molecular orbital theory is also presented.

### **WEEKS 6-8 PURE PHASES TO SOLUTIONS (CH. 12 & 14)**

We define and describe the intermolecular forces & their roles in the physical properties of pure liquids and solids. You are introduced to phase diagrams. After the pure condensed phases, qualitative & quantitative aspects of (mostly) aqueous solutions, particularly colligative properties, are discussed. (Note that we will return to Ch. 14 to discuss energetics, after we cover the material in Ch. 13.)

### **EXAM 2 TUESDAY, OCTOBER 13, 2020 (20%)**

### **WEEKS 8-10 THERMODYNAMICS (CH. 13) & EQUILIBRIUM (CH. 15)**

Our first week(s) covered thermochemistry, with particular focus on enthalpy. In this unit, thermodynamics is covered more deeply, incorporating qualitative and quantitative aspects of entropy and Gibbs' free energy. The discussion of thermodynamics provides a smooth transition to the concept of chemical equilibrium. We will also spend time learning to do equilibrium calculations, which will be essential to the quantitative aspects of the next three chapters.

### **WEEKS 10-13 ACID-BASE EQUILIBRIA (CH. 16-17) & SOLUBILITY (CH. 18)**

Chapters 16-17 expand upon the concept of acid-base chemistry, covered in your previous chemistry course, while incorporating quantitative and qualitative aspects of chemical equilibrium. We define strong and weak acids and bases and also cover concepts such as the relationship of molecular structure to acid (or base) strength, acid-base titrations & buffer chemistry. We will also briefly cover solubility equilibria in Ch. 18.

### **EXAM 3 TUESDAY, NOVEMBER 17, 2020 (20%)**

### WEEKS 13-15 ELECTROCHEMISTRY (CH. 19)

We will briefly review oxidation-reduction chemistry (Ch. 5), leading to our last chapter on electrochemistry. Topics of discussion include standard potentials, the galvanic & electrolytic cells, and the quantitative relationships with thermodynamics. Applications of these concepts, such as batteries, fuel cells, and corrosion, will be described.

### WEEKS 15-16 KINETICS (CH. 20)

Chemical kinetics covers the relationship of time and chemistry, which is not addressed in the previous chapters. Key concepts include rate laws, the integrated rate law, collision theory, and reaction mechanisms. The application and relevance of catalysis are described here.

### EXAM 4 THURSDAY, DECEMBER 17, 2020, 12:00 P.M. (NOON) (15%)

Exam 4 is scheduled for Finals Week. It will take place on Thursday, following the campus schedule. Exam 4 will start at 12 noon.

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### EXAM POLICIES

1. **Students with the privilege of attending the University of Hawai'i will conduct themselves honorably at all times. To give, to receive, or to use aid of any kind during an examination injures the university, students doing honest work, and the individual guilty of such dishonesty.** Acts of academic dishonesty include, but are not limited to, giving or receiving unauthorized assistance during an exam, obtaining unauthorized information about an exam before it is given, submitting another's work as one's own, using prohibited sources of information during an examination, and altering answers after an exam has been submitted. Such acts will result in the appropriate actions in accordance with the University of Hawaii's policy on student conduct and academic honesty.
2. **The exams cover material from the lectures, reading, and homework assignments.**
3. **Due to the nature of the current pandemic, exam procedures are under "ongoing consideration"**. Therefore, we may adopt additional exam-taking conditions (e.g., video monitoring, proctoring, etc.), you may be given new exam-taking requirements, and/or existing policies (see 4-7 below) may be modified. Please also note that we may have to adapt to changing conditions throughout the semester.

I will do my best to keep you updated, so that we can all be prepared, with minimal anxiety about the procedures for each exam. As students, you will each need to be diligent in keeping up with what is happening in class.

4. **Exams will be administered online.** Exams will contain computer-graded questions (multiple-choice, fill-in-the-blank) and ones that I will grade (e.g., short answer, uploaded responses). Some problems will require a written response, which you will need to scan or capture and then upload it to Lualima.

5. **You are/will be advised on what items & resources you may use.** Some of the allowed items are listed here. Others may be added for Exams 1-4. **If an item or resource is not designated as “allowed”, then its usage is prohibited.**
6. **You will be allowed to use a calculator for problems that include calculation.**
  - A calculator is a small electronic object designed specifically and solely for calculation.
  - Your calculator may be subject to a random check on the day of an exam.
  - Use of all other electronic devices are prohibited during the exams. You are not allowed to use the calculator function on your phone, tablet, smart watch, or any other mobile device.
  - You are not allowed to use the calculator app on your computer/laptop/etc.
  - You must clear the memory on your calculator before exams.
7. **Your cell phone may ONLY be used to scan and upload exam responses to Laulima. You may not use your cell phone for other purposes (texting, calls, etc.) during the exam.** If you expect an urgent call during the exam period, let me know BEFORE the class starts.
8. **Tentatively, we are planning to use video monitoring during the exams,** which means that you will need to be working on a computer (or with a phone) that will have its camera facing you for the entirety of the exam.
9. **If you miss (or will miss) an exam, you must let me know – as soon as possible – to discuss your absence.**
  - *If you have some advance notice,* then please let me know as soon as possible, so we can make arrangements for an early exam.
  - *If something happens on the day of the exam that prevents you from taking the exam,*
    - Please send me a message (either Slack DM or email), as soon as reasonably possible.
    - If you have a good reason for missing an exam, I will give you a couple of options on how to “makeup” the missed exam.
  - *Please provide documentation of your absence, if possible.* Examples of such documentation in the past have included flight/travel itinerary or a doctor’s note. Particularly with any illness or emergency related to COVID-19, documentation might not be feasible. As a result, I will need to count on each of you to conduct yourselves honorably in this class, particularly as it relates to our exams.
10. **What happens if there is an emergency on exam day that impacts the entire class?** I will use Slack and Laulima to provide updates.

## GENERAL CLASS POLICIES

These class policies are intended to create, build, and sustain an environment that is conducive to learning (and teaching!) and supportive of our individual and collective goals. Modifications have been made to my class policies, as CHEM 171 in Fall 2020 must be conducted “100% online”. Any significant changes to the course policies – particularly as it relates to grading – will be confirmed with a revised syllabus.

- 1. Success usually comes with regular attendance and timely completion of reading and problem assignments.** I suggest some sensible strategies for your success:
  - **Prepare for my lectures and attend class consistently.**
    - **Read.** At the start of every lecture, I'll give you the reading assignment that “matches” the day's lecture, as well as the reading for the next class.
    - **Download handout(s) before class.** Handouts will be posted to Lulima (under “Resources”).
  - **Take good notes by hand.** Write your notes by hand during lecture and/or rewrite your notes after class is finished.
  - **Review your lecture notes shortly after class is finished.**
  - **Use the recorded lectures to fill in gaps, review the day's material, etc.** I will record all of my classes and will upload them to our Lulima site. The PowerPoint files that I use for my lectures will be viewable on the recorded lectures, but they will not be posted or shared. The recordings should always be considered as a “fall-back” (for your own notes) and not a replacement for coming to class.
  - **Do the homework problems in a timely fashion.**
  - **Do not wait until the last minute/hour (or day!) to study for an exam.** In normal times, I would include this statement: *“On the day of and the day before an exam, I do not answer questions about the exam material. You must manage your time effectively and be responsible for the outcome of these exams and this class.”* During this unusual time, however, I am relaxing this rule to a limited extent. Please be thoughtful and reasonable, if you are sending a last-minute question – and be realistic about the possibility that I may not respond before the exam.
- 2. Seek help when you have questions.** The most efficient way to communicate with me is (*usually!*) face-to-face. However, in the Fall 2020 semester, I welcome your questions and discussion via Slack and Zoom.
  - My CHEM 171 “office hours” will be held via Zoom, when needed. (Dates/times TBA)
  - If you would like to set up an appointment, please send a message (preferably DM on Slack), with two or more times that you are available.
  - Please try to prepare for your meeting with me, as best as you can. If possible, have detailed questions about, e.g., a specific homework problem (or a specific type of homework problem).
- 3. Any student who feels she/he/they may need an accommodation based on the impact of a disability should contact the KOKUA Program** (Office for Students with Disabilities) to ensure reasonable accommodations in CHEM 171. KOKUA can be reached at (808) 956-7511 or (808) 956-7612 (voice/text) in room 013 of the Queen Lili'uokalani Center for Student Services.

4. **My lectures and associated course materials (handouts, exams, quizzes, PowerPoints, etc.) belong to me. They are considered my intellectual property.** Some materials are copyrighted by Pearson, the publisher of our textbook.
- You are allowed to view the recorded lectures during the Fall 2020 semester. I prefer that you use the uploaded lectures on Lulima.
  - You are not permitted to share the recorded lectures (regardless of source) -- or any original course materials -- with anyone who is not registered in this class at any time (now or future).
  - In addition, posting a Zoom recording to any site (other than Lulima) carries the “potential risk of exposure and violation of FERPA consent requirements, depending on the recording’s contents”.
  - The lectures and any course material may not be posted to any public or private website. You are not allowed to sell or share exam or quiz questions.
5. **Let’s work together to create an optimal learning and working environment.** Even in the midst of these most unusual times, there are ways to make this experience effective and (hopefully!) enjoyable. However, I need your collective and individual help.
- **Let’s begin our class on time.** Please be ready to start at 3:30 on Mondays, 12 noon on Tuesdays and Thursdays.
  - **Please be courteous, if you are late.** Better to come to class a little late than not at all! However, if you think you might be regularly late, please let me know, as a courtesy.
  - **Plan to stay until the end of the class period.** Please let me know, if you will need to leave early on a regular basis, again, as a courtesy. On occasion, I may run slightly overtime, so I ask for your understanding and cooperation in advance.
  - **Minimize distractions to yourself and others.** Try to find the best place to setup, so you can “attend class” in a quiet place with few distractions. Put your phone into ‘do not disturb’ mode, so you are not distracted by texts, phone calls, or social media.
  - **I will typically mute all of you to optimize the quality of the stream (Zoom).** I may also ask that we stop our video for the same reason
6. **Any changes to the class structure or schedule will be announced and/or confirmed via email.** I will also announce these changes in class. Major changes to the class will be confirmed with a revised syllabus. Note that these “major changes” typically result from an unusual and severe emergency, such inclement weather or, as we have seen, a global pandemic.
7. **Please let me know if you have any questions about my course. I look forward to working with you!**