Chemistry 230: Physical Chemical Principles and Applications
Fall Term 2019

Dr. Amy C. Gottfried (acgottfr@umich.edu)

Office: CHEM 3533; 734-647-9540

Section 100 TBL: MWF 8:00-8:50 am BSB 1060
Section 101 TBL: MWF 9:00-9:50 am BSB 1060

Office Hours:

Dr. Gottfried will have Question and Answer (Q&A) sessions. GSIs will have weekly office hours held at the SLC. You may attend any or all GSI office hours. All Q&As and office hours are posted on Canvas home page.

Prerequisites:

CHEM 130 OR placement in CHEM 210.
You should be knowledgeable about the following concepts: matter, energy; elements, atoms, and molecules; moles, atomic masses, and molar masses; chemical equations; reaction stoichiometry; and limiting reagents. These topics are critical to understanding the chemical topics covered in the course. These topics will not be covered explicitly as new topics in class so if you need further help in mastering them there are many web-based tutorials as well as texts to use as reference. Please feel free to ask questions and take advantage of staff office hours/Q&A sessions.

Course Goals:

1) Qualitative and quantitative understanding of interconnected chemical concepts: You should be able to explain a chemical concept, the variables associated with it and how changing it affects the different aspects of a system qualitatively. You should be able to mathematically solve for the quantity associated with that variable.

2) Application: You should be able to apply the chemical concepts that you have mastered in a novel context.

3) Preparation for the future: You will find topics that we study will appear again in other courses such as biochemistry. Many of you will also gain conceptual understanding and problem-solving skills that will be of benefit to you on pre-professional exams and in graduate courses.

4) A chemistry world view: By the end of the semester, I'd like you to see something in the world around you a little differently as you envision the chemical principles at work.

Required Materials:

1) **Sapling Access** for electronic homework: *Purchased via Sapling or* ISBN 1464112673 (*cost: $42.00)*
You MUST use the Sapling Learning link from Canvas (Assignments) to enroll.
   - Goto Canvas; Assignments… Click on any of the Sapling Homework Assignments. Select your access option and continue to your assignment page.
   - You are now enrolled in the course and can access future assignments through Canvas or Sapling.
   - **Need Help?** The Sapling technical support team can be reached by phone, chat, or by email via the Student Support Community: https://macmillan.force.com/macmillanlearning/s/.

2) **i>clicker remote** (http://bit.ly/studentclickers)
For this class you must have a clicker device. **Personal devices with the web-clicker subscription may not be used in this class.** Please check to make sure you have registered your clicker on Canvas.

3) Scientific calculator (graphing or non-graphing)

Resources:

a) A **MUST DO** set of practice problems for each exam aka **PREP*** (Past and Relevant Exam Problems). Blank copies and keys will be posted on Canva *The PREP problems help you to connect and apply concepts as well as to prepare for exams. When working PREP problems keep the answer key CLOSED!…**do not peak**! You will not learn enough if you just look at the solution to a problem. Would you be a good athlete if you just watched others play the game and never practiced yourself? You should be able to explain concepts clearly, solve problems, and identify when a given concept can be applied to a problem and then successfully apply it.
b) **Piazza** discussion board. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. (You can go there via Canvas)
c) Readings from two on-line sources that are linked through the Topics pages on Canvas.
d) **SLC study groups** (http://www.lsa.umich.edu/slc/).
e) **Lecture Capture** of all TBL and some Q&A sessions.

Spending time using a resource does NOT guarantee that it will help you learn. Find the resources that help YOU learn best.

Course Components

1, 2) Pre-class and in-class TBL time

Traditionally the content delivery (the easier and less challenging aspect of the course) was done as a lecture during the very valuable class time. Content delivery and reception has been moved to videos to be consumed outside of the classroom. Traditionally the applying of concepts and learning to problem solve (the harder, more challenging aspects of the course) were done by students on their own outside of class. This work will now begin in the classroom when you have the support of your classmates, instructor, and GSIs.

You may have noticed that the class meets in the new BSB-Team Based Learning (TBL) 1060 classroom. This fantastic new space is NOT a lecture hall where everyone faces the front of the room in order to direct their attention solely to the instructor. The space will NOT lend itself to a passive delivery of lecture content from a solo instructor. Thus, content delivery will come through video and notes (supplemented by on-line reading if you like.) You should watch the video content, take notes, and complete a short quiz/homework check via Sapling. The Sapling questions are designed to check your very basic knowledge and get you started on the basics of equation solving. Think of them as a warm up for class.

In class, WE will work on novel problems and clicker questions. The time in class will be very active. You will benefit from the exchange of ideas and problem-solving strategies with your peers, myself, and the GSIs. It will be dynamic and sometimes messy and those are both good things.

Educational research shows that the activities that take place in Team Based Learning (TBL) environments promote problem-solving abilities.[1] Students who learn in TBL environments perform a half standard deviation better than they do in STEM courses that are primarily lecture driven.[2] It has been found that students of all levels and abilities benefit in a TBL environment.[3] Students in active learning classes report that this format aids their ability to connect

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[1] Haak,D.C., HilleRiLamberts, J.,Pitre, E., & Freeman, S. (2011). Increased structure and active learning reduce the achievement gap in introductory biology. *Science, 332*(6034), 1213-1216. Doi:10.1126/science.1204820

[2] Freeman,S., Eddy, S. L., McDonough, M., Smith, M. K., Okorafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences, 111*(23), 8410-8415. Doi: 10.1073/pnas.1319030111

[3] Walker, J. D., Brooks, D. C., & Baepler, P. (2011). Pedagogy and space: Empirical research in new learning environments. *EDUCAUSE Quarterly, 34*(4). Retrieved from http://www.educause.edu/ero/article/pedagogy-and-space-empirical-research-new-learning-environments

with fellow students and with instructors, as well as increasing their ability to work in groups (a real-world skill.) TBL supports the seven research and teaching based principles for improving undergraduate education:[4]

- Encourage contacts between students and faculty
- Develop reciprocity and cooperation among students
- Use active learning techniques
- Give prompt feedback
- Emphasize time on task
- Communicates high expectations
- Respects diverse talents and ways of learning

My role as instructor is still as content deliverer (I will make sure that you get all of the content outside of the class.) But now, I can also be a guide, a supporter, a feedback-giver, a trouble-shooter, and an example setter.

3) Discussions are led by GSIs who are experienced learners and chemistry problem solvers. They will help you clarify any muddy points, apply your problem-solving skills, connect concepts and check your understanding. At most discussions you will presented with a new set of problems for you to collaborate on. Or you might The work on answering PREP questions and reviewing for exams. Attendance at discussions is not required but strongly encouraged.

Electronic devices

The TBL space is designed for the use of electronic devices to support your learning and I encourage you to bring your laptops, tablets, or smart phones with you to class as the may be useful resources for completing in-class assignments. Keep in mind, however, that using personal electronic devices in the classroom can also be a distraction, not only for you, but also for other students. **Please silence your phones so that your work in not interrupted by any notifications or calls.** Because of the arrangement of the space, some students will have an unobstructed view of your computer screen which may be difficult to ignore. Please respect your classmates and instructors by refraining from using your devices for non-class related tasks such as checking Instagram, catching up on your e-mail, or catching up on the news on-line. For class activities that I deem that your undivided attention is needed, I may ask you to put away all electronic devices.

Grading:

1) Pre-TBL Sapling Quiz/Homework (140 pts): You are expected to complete the pre-TBL videos, quizzes, and Sapling homework before each TBL meeting. After watching the videos for each class meeting, you should complete the Sapling Quiz/Homework. Some problems are multiple choice concept questions that relate directly to the video material; some are more quantitative, asking you to manipulate an equation or explore how to use it; some may review the material that we worked on the previous class. As you work on the problems in Sapling, you may talk to others and ask questions at a Q&A or at GSI office hours or in Piazza. However, you should do your own (randomized) set to aid in your own learning! You have 5 tries on each Sapling problem. There will be 39 total Pre-TBL Sapling assignments worth 4 pts each. Your lowest 4 scores will be dropped. 140 is the maximum point total for Sapling. NOTE once you open an assignment in Sapling, you will see a 0 in the gradebook in Canvas. And, there is a delay in earning points in Sapling and an updated score in Canvas. Check back in about 30 minutes and if your score is still not updated, then reach out for help.

There will NO make-ups for missing Pre-TBL Sapling assignments.

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[4] Chickering, A. W.; Gamson, Z. F. "Seven Principles for Good Practice in Undergraduate Education." *AAHE Bulletin*, Mar 1987 p 3-7.

2) In and post TBL: *i>clicker* and team white board pictures (105 pts): Each individual is expected to bring their own clicker to class for each TBL meeting. You MAY NOT ask someone else to click in for your or bring a clicker for someone else to class. You MAY talk about the answers to the clicker questions with your group but you are free to choose your response individually. You will receive half credit for clicking in and full credit for clicking in with the correct answer.

For the other problems presented in class, each group should work on a white board. One group member should be assigned to take a picture of all of your work and to submit it on Canvas by the end of the next class period.

In order to receive ANY in-class points, you must click in for at least one question. After clicker scores and team pictures have been uploaded, the in-class TBL points will be assigned as follows: In-class total = (If clicker > 0, then clicker points + team picture points, else = 0)

There will NO make-ups for missing class unless you have documentation of extenuating circumstances that causes you to miss 3 or more days of class for the SAME documented excuse.

100% participation at ALL class meetings is an unrealistic goal. Life may keep you away due to illness, a funeral, an event that is part of your educational experience, a family event, etc. In order to receive full credit for the in-class points you only need to earn 82% of the points offered. Keep an eye on the total in this category in Canvas. If your total is 82% or higher, you are earning full credit. At the end of the term, your percentage of points earned will be used to calculate your point total as follows: (if in-class% >81.99%, then 105 points), else in-class%*100/82*105 points). You may not earn more than 100% or 105 points for the semester.

3) Team evaluations (30 pts total) You will receive 3 pts for filling out the CATME survey used to set up and rotate teams. You will work in three different groups during the semester. At the end of each time working with a group, you will be asked to evaluate your teammates on their honest efforts as part of your TBL team. You will receive 2 pts per evaluation for filling it out. The remaining 7 points will come from your teammates.

3) **Exams:**	***Exam 1***:	Tuesday, **Sept 24,** 6-7:30 pm (70 points)	*Topics 1&2*
	Exam 2**:	Tuesday, **Oct 8,** 6-7:30 pm (125 points)	*Topics 3-5 (first half)*
	Exam 3:	Tuesday, **Nov 5**, 6-7:30 pm (160 points)	*Topics 5-8 (first half)*
	Exam 4:	Monday, **Nov 25,** 6-7:30 pm (160 points)	*Topics 8-10*
	Final Exam:	Friday, **Dec 13,** 8-10 am (210 points) in the morning	*Cumulative Topics 1-12*

If you have a conflict with any exam or documented exam needs (ie extended tie, TAC, etc.) fill out the form: https://forms.gle/FrJyCmVfqhVhxmPR6***. The deadline for TAC accommodations (documented extended time) is 5pm on Tuesday, Sept 10. All other requests must be made via the form by 11:59 pm on Thursday, September 12.***

**Yom Kippur also begins this evening…there is a religious observance every Tues in October with the exception of Fall Break Tuesday…please request an alternate time if you will be observing Yom Kippur during the exam time and we will be happy to accommodate)

If an emergency arises at exam time let Dr. Gottfried know ASAP (ideally before the exam.)

- You may not use a cell phone, apple watch or any other communication device on any exam at any time.
- You will have an equation sheet and periodic table given to you for each exam.
- You will need a scientific calculator (graphing or non-graphing) for each exam.
- Exams are intended to focus on the most recent material covered. However, concepts in the course build on previous concepts and so exams may include any material from the course.

On Exam Regrades

Graded exams will be scanned and posted on M+Box on Canvas as quickly as possible. You will have until the Thursday after the exam to submit a re-add or re-grade. After that time, your grade on that exam will stand.

We do our best to grade examinations with consistency and fairness. However, we can and do sometimes make errors and we want to ensure that they are corrected. If you feel that an adding error has been made, follow the directions on Canvas for a "re-add." All pages will be re-added. ***Your final score may be reduced*** in this process.

We do consider alternative answers that are consistent with the information in the problem. If you think your answer is correct and consistent and was still marked at incorrect, you may present an argument in favor of your answer. Follow the directions for a "re-grade" on Canvas. Your entire exam will be checked over to ensure complete fairness and consistency. ***Your final score may be reduced*** in this process. You may NOT argue for a change in how the exam was graded.

Your final grade will be assigned as the higher of the following two possibilities:

Option A: (exams only) 4 in-term exams + final exam = 725 pts

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Option B: (Full class participation + exams…highly recommended)

Preparation for class (videos + Sapling quiz/homework)	140
In class clicker, team pictures, team evaluations	135
Exams (4 in-term exams + final)	725
	1000

Minimum quantity of points needed to achieve a letter grade under Option B. (Points for Option A in parentheses.)

950 points (689) A+	800 points (580) B+	650 points (471) C+	500 points (363) D
900 points (653) A	750 points (544) B	600 points (435) C	< 500 points (<363) E
850 points (616) A-	700 points (508) B-	550 points (399) C-	

During the term, the grade that you see on Canvas is only an ESTIMATE of your final grade. After the final exam, your grade in Canvas will be converted to points and only then will you be able to match your points to your final grade with absolute certainty.

On final grade appeals:

Departmental policy indicates the first step in inquiring about the accuracy of a final grade should be directed to the lead instructor of the course. This initial inquiry should take place within the first fifteen University business days of the first full term following the term in which the disputed grade was issued. If, after this inquiry, the student is not satisfied with the instructor's response, the student may choose to initiate a formal grade grievance. To initiate a formal grade grievance, the student should contact the Associate Chair of Undergraduate Studies (ACUS) of the home department of the course in question before the end of the fifth week of classes in the first full term following the term in which the disputed grade was issued

Academic Integrity

"The undergraduate academic community, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. The College holds all members of its community to high standards of scholarship and integrity. To accomplish its mission of providing an optimal educational environment and developing leaders of society, the College promotes the assumption of personal responsibility and integrity and prohibits all forms of academic dishonesty. Conduct that violates the academic integrity and ethical standards of the College community cannot be tolerated and will result in serious consequences and disciplinary action."……
Academic Judiciary Manual of Procedures College of Literature, Science, and the Arts

Academic misconduct will result in a grade of 0 on the assignment for which it takes place. Examples of misconduct include use of notes on an exam; copying off of another student's exam or homework; turning in a modified exam for a regrade, etc. Please read the Academic Misconduct in LS&A for more examples.

Student Mental Health and Wellbeing

University of Michigan is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact **Counseling and Psychological Services (CAPS)** at (734) 764-8312 and https://caps.umich.edu/ during and after hours, on weekends and holidays, or through its counselors physically located in schools on both North and Central Campus. You may also consult **University Health Service (UHS)** at (734) 764-8320 and https://www.uhs.umich.edu/mentalhealthsvcs, or for alcohol or drug concerns, see www.uhs.umich.edu/aodresources. For a listing of other mental health resources available on and off campus, visit: http://umich.edu/~mhealth/.