THINGS THAT YOU MUST DO DURING WEEK #1:

- Purchase required materials.
- Register for CONNECT through course BLACKBOARD LEARN only!
- Register iClicker on BLACKBOARD LEARN only!
- Read all the information in this course packet.
- Read the Reading Assignments – handed out on first day and posted on Blackboard Learn
- Complete the safety certification available on the course Blackboard page with a score of at least 20/25 before you have lab on September 5th. You must complete your safety certification before you can work in lab.
- Attend recitation.
- Do NOT register your materials on the iClicker or CONNECT websites directly.

Required Materials

- Registration/Access code for CONNECT online homework & e-book (can be purchased with the textbook). Purchase through Blackboard via CONNECT or McGraw-Hill store link.
- Textbook: OPTIONAL PHYSICAL VERSION of CHEM12901: Purdue General Chemistry with Biological Focus (Purdue University Edition), e-book or any 3rd edition of “Chemistry: Atoms First” by Overby and Burdge.
- A virus-free electronic storage device for lab data
- A padlock for your assigned lab drawer by Week 4, September 11-15.
- Approved safety goggles, available at the bookstores, outside WTHR 200 during the first two weeks of classes, or from the storeroom on the 1st or 2nd floor in BRWN.
- A Sharpie (black, permanent ink) for marking lab glassware
- A simple battery operated scientific calculator with exponential, logarithm and square root functions will be needed for exams. Two-line non-programmable calculators are allowed. Alpha-numeric and programmable calculators will NOT be allowed for exams. Acceptable calculators are available for purchase outside WTHR 200 during the first two weeks of class
- iClicker (Bookstore or outside WTHR 200 during the first two weeks of classes)
DETERMINING YOUR COURSE GRADE, FALL 2017

We are aware that chemistry can be difficult material for some people to learn. At the same time your professor understands that learning chemistry is not impossible and that a variety of different teaching and learning methods may assist with the learning process. In CHM 12901, you will have the opportunity to learn individually, with partners and in groups in lectures, recitations, labs and outside of class study time.

Experts indicate that to adequately learn new material in college, 2-3 hours of effective study outside regularly scheduled class time each week per one (1) credit hour is required. CHM 12901 is a 5-credit course so this suggests that 10-15 hours per week of effective study outside of regular class time is necessary to learn what we want you to learn.

The chemistry department provides several sources of help for you in this process at no cost. These include the professor, the CHM 12901 Graduate Instructors (TAs) and the Chemistry Resource Room.

Each of the assigned course activities for CHM 12901 is worth the number of points listed below. Before course grades are finalized at the end of the semester the following scores will be dropped:

- your lowest homework score
- your lowest two recitation activity scores
- your lowest lab score
- your lowest exam score

The total number of points for CHM 12901 will be distributed as follows:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Points</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>180 pts</td>
<td>Best 12 of 13 scaled to 15 pts each</td>
</tr>
<tr>
<td>Recitation Activities</td>
<td>165 pts</td>
<td>Best 11 of 13 scaled to 15 pts each</td>
</tr>
<tr>
<td>Labs</td>
<td>250 pts</td>
<td>Best 10 of 11 scaled to 25 pts each</td>
</tr>
<tr>
<td>Course Packet Quiz</td>
<td>5 pts</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>Exams</td>
<td>600 pts</td>
<td>Best 4 of 5 exam scores at 150 pts each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Midterm Exams (450 pts)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final Exam is worth 2 exams (300 pts)</td>
</tr>
</tbody>
</table>

**TOTAL** 1200 pts

Extra Credit Max 15 pts possible Top 15 scores via iClicker in-class exercises*

*If more than one iClicker exercise is given in a single day’s lecture, the total daily score will be scaled to 1 pt. There may not be iClicker exercises every lecture, but most lectures will afford you ample opportunity to obtain extra credit. These points will be added to your total score at the end of the semester, and your grade will still be determined out of 1200 pts.

Your final course grade will be based on the following scale out of 1200 total points:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1080 - 1200+</td>
</tr>
<tr>
<td>B</td>
<td>960 - 1079.99</td>
</tr>
<tr>
<td>C</td>
<td>840 - 719.99</td>
</tr>
<tr>
<td>D</td>
<td>720 - 839.99</td>
</tr>
<tr>
<td>F</td>
<td>Fewer than 720 points OR failure to complete 3 or more of labs*</td>
</tr>
</tbody>
</table>

* This is course has a required lab component. If you miss 3 or more labs, your course grade is automatically an F.

Plus grades are determined at the instructors' discretion at the end of the semester. No minus grades are given.
Save all returned graded papers and your exams until after you have received your course letter grade for CHM 12901. If you claim that an incorrect score has been recorded for you, we will need to see your paper(s) before we can consider any change in the score or your course grade.

It is your responsibility to check and verify that your scores posted on Blackboard are correct. Shortly after each of the first three exams and shortly before the final exam, all your scores to date will be available to you at the Blackboard grade book. You must report any errors to your graduate instructor (TA) or to the professor within two weeks of the time they were posted. All disputed or missing scores must be resolved with your graduate instructor (TA) or the professor before the final exam. There will be no score correction considerations after the final exam.

Disability Accommodations
If you require accommodations to access course activities or materials, the accommodations must be described and approved by Disability Resource Center, Young Hall Room 830, 302 Wood Street, 494-1247, www.purdue.edu/drc. To implement accommodations, you must follow the instructions listed as Responsibilities of the Student in the letter prepared by the Disability Resource Center. Take a copy of this letter to your professor or the course supervisor within the first three (3) weeks of the semester or within one week of the date of the letter to discuss your accommodations. Timely notification is critical for timely implementation.

Grief Absence Policy for Students (GAPS)
If you experience the death of a family member or close friend, notify the Office of the Dean of Students at 765-494-1747. Scores for any missed assignments under a verified GAPS absence will be pro-rated (assigned a score based on your average for the assignment type you missed).

Campus Safety and Emergency Preparedness
In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Please check Blackboard and your Purdue e-mail for updates.
SOURCES OF HELP FOR STUDENTS IN CHM12901

Graduate Instructor (TA) Office Hours, WTHR 117: Each CHM 12901 graduate instructor (TA) will hold a one-hour office hour each week where any CHM 12901 student can go to get help with chemistry at no charge. This is over 20 hours each week where free help is available from the CHM 12901 staff. If you are having a problem with some aspect(s) of the course, go first to your graduate instructor (TA). He/she wants to help you and is available for consultation both at specific hours and by appointment. Feel free to go to the office hours with a classmate or small group if you feel uncomfortable going alone, or to go to the office hour of another CHM 12901 graduate instructor (TA). A complete schedule of office hours is posted on Blackboard. If you have any questions about office hours contact the course supervisor, Anna Ratliff, at ratliffa@purdue.edu.

Professor: You can go to the professor's office hour or make an appointment with the course professor. E-mail addresses and office hour times are on the cover page of this packet or will be provided on Blackboard.

Chemistry Resource Room, WTHR 117
http://www.chem.purdue.edu/academic_programs/resource-room/
The staff in this area can answer many of your chemistry related questions but going to your professor or a CHM 12901 graduate instructor (TA) first is recommended. The Chemistry Resource Room is also an area where you can study alone or with others. Various kinds of help for all general chemistry students are available. The resources include:

- Free help and tutoring from the staff assigned to this area
- A variety of course materials (e.g., lecture notes, exam answers, the course text, and lab manuals)
- Numerous audiovisual and auto tutorial programs on chemistry
- A student ID card is required to check out most of the materials in the Chemistry Resource Room.

Purdue General Chemistry Help Site  http://www.chem.purdue.edu/gchelp/ Visualization and Problem Solving for General Chemistry

Academic Success Center  https://www.purdue.edu/studentsuccess/academic/index.html  Get help with reaching your academic goals.

Supplemental Instruction (SI):
There are Supplemental Instruction (SI) study sessions available for this course. These study groups are open to anyone enrolled in this course who would like to stay current with the course material and understand the material better. Attendance at these sessions is voluntary, but extremely beneficial for those who attend weekly. Times and locations for the study session can be found here: www.purdue.edu/si or the free app: www.purdue.edu/boilerguide

Students who attend these interactive sessions will find themselves working with peers as they compare notes, demonstrate and discuss pertinent problems and concepts, and share study and test-taking strategies. Students are asked to arrive with their student ID card, lecture notes and questions to these informal, peer-led study sessions.
COURSE ACTIVITIES, POLICIES AND PROCEDURES

Lectures
Student versions of the lecture notes will be handed out in class and posted on Blackboard after each lecture. A completed set of lecture notes will be available on Blackboard at the end of each week of lectures. You will be responsible for any announcements or course changes that are made in lectures.

Cell phones, computers, laptops, iPods or other electronic devices that are not being used for instruction purposes, are distracting for everyone in a learning situation. Please respect your colleagues and turn off this equipment in lectures as well as in recitations and labs. Talking out loud to friends or neighbors is disrespectful to the lecturer and should be avoided.

iClicker
We will use iClicker remotes for in-class participation. You will be graded on your answers and/or your in-class participation. iClicker will be used during most lectures, and you are responsible for bringing your remote each time. Put a piece of scotch tape over the iClicker ID so it won’t wear off! i-Clicker remotes may be purchased outside WTHR 200 (cash only) during the first week of class or from the bookstore. You must have your i-Clicker properly registered by October 1 in order to receive extra credit points in CHM 12901 this semester. Go to the registration site using the link on the course webpage on Blackboard. (Do NOT register your i-Clicker through the i-Clicker company website.)

Exams
CHM 12901 will have 3 midterm exams at 1.5 hour each and a final exam of 2 hours.

Fall 2017 hour exam schedule:

Exam I: Tuesday, October 3 8:00 - 9:30 pm
EE 129
EE 170
WTHR 200

Exam II: Thursday, November 2 8:00 - 9:30 pm
EE 129
EE 170
WTHR 200

Exam III: Thursday, November 30 8:00 - 9:30 pm
EE 129
EE 170
WTHR 200

Final Exam: Time and Place To Be Announced - see below

Attendance at exams is required. We do NOT give make-up exams and absences must be accompanied by an official University memo. Excused absences will be prorated at the end of the semester and the missed score will be replaced with the average of your other exams. You will receive zero points for additional missed exams. Unexcused absences will result also in a zero. If you arrive more than 20 minutes late to an exam, you will not be allowed to take the exam. If you arrive within 20 minutes, you will not receive additional time to complete the exam.

Bring your PUID, a one or two line non-programmable calculator (see details on the front page), and #2 lead pencils with you to the exam. You may not share a calculator with another student.
Final Exam
The final exam is a 2-hour exam. The time and place will be announced mid-semester. Wait until you know the date of the final exam before you make travel plans that might conflict with the exam. Final exams will NOT be rescheduled to accommodate your travel plans.

University policy on Final Exams states: Students scheduled for more than two (final) examinations in one calendar day are entitled to reschedule any examination in excess of two. It is the responsibility of the student to make necessary arrangements before the last week of regularly scheduled classes.

If you are ill or have an emergency during the final exam, you will first need written documentation of the illness (e.g., a note from your physician or PUSH stating that you were incapacitated due to illness or documentation of the emergency) and have that documentation verified by the Dean of Students Office. Once receiving proper documentation, you should then bring that information to the professor. We will then prorate your exam scores as follows. You will automatically drop half of the final instead of any midterm exam we already had. Those three exam scores from the semester will be averaged and will count as the half of the final that you didn't drop.

On-Line Homework (CONNECT)
Each on-line weekly assignment will consist of required questions and possibly optional questions. Required questions will contribute to your homework point total, while optional questions will not. However, optional questions and tutorials can be used to help understand how to work problems or to practice and review for exams. Assignments are to be completed on-line accessing CONNECT from the BLACKBOARD LEARN PURDUE WEBSITE ONLY (https://mycourses.purdue.edu/)

Deadlines for completing the on-line assignments will be listed on the online BLACKBOARD LEARN Assignment page. You will have a maximum of three (3) attempts per question per submission to complete each homework assignment before the listed due date. You will be able to submit each homework assignment TWICE. The AVERAGE of the two attempts will be used as your score for the homework. The question and/or answer content and order will be different upon subsequent attempts. Homework will be scored and recorded on-line so there will be no hand grading or regarding of homework.

No time extensions are possible for homework assignments. If you miss the posted homework deadline, you will be able to continue working on the problems and your answers will be graded by the program, but you will not receive points for work done after the deadline.

Recitation Attendance is Required
CHM 12901 recitation sessions are required. Recitation sessions provide you with the opportunity to ask questions and work with your graduate instructor (TA) and classmates in smaller groups. You will have time to ask questions. Recitation sessions are not long enough to answer all the questions that all students may have. If you have difficulties or have questions about certain problems, you should seek help from your professor or a CHM 12901 graduate instructor (TA) during scheduled office hour. Your pre-lab assignment for the current week’s lab is due at the beginning of your scheduled recitation for full credit. If you are unable to attend recitation, you can have a classmate submit your pre-lab for full credit in your scheduled recitation.

You will receive a maximum of 15 points per recitation session. You need to attend a minimum of 11/13 sessions – two are dropped at the end of the semester. You will receive 5 points for attending. The remaining 10 points will be for participation (3 points) and group activity work (7 points). A worksheet from your group will be turned in at the end of each recitation with all group members’ names. The TAs will be circulating in the room to monitor participation and provide help.
Labs

Attendance: Attendance is required because CHM 12901 is a laboratory course. We do not offer make-up labs. You are responsible for the material covered in any lab you miss since questions based on the lab projects may appear on exams. Always bring your PUID with you to lab.

Lab project completion: You are required to complete 9 of the 11 scheduled lab sessions (Labs 1-11, including take-home labs) to pass the course. This does not include the week of Check-Out. Attendance at Check-out (Lab 12) is mandatory.

A failure-to-complete score (zero points) for lab will be assigned in the following cases:

- being absent for any reason
- being dismissed from lab for safety violations including improper dress
- arriving more than 10 minutes late
- inadequate preparation for lab that hinders participation
- not contributing constructively to the group’s work in the lab
- failure to submit a lab report
- not participating in preparation of the lab report.

Penalties for failure-to-complete labs are as follows:

- 1st fail-to-complete lab: no score; can be dropped at the end of the semester as the lowest lab grade
- 2nd fail-to-complete lab: score of zero (will be included in calculation of total points)
- 3rd fail-to-complete lab: an automatic grade of “F” will be assigned for the course at the end of the semester.

Safety Certification: To be permitted to work in lab, you must complete the online safety certification found on Blackboard LEARN with a score of 20/25 or better. The first lab sessions are Sept. 5; plan to complete your certification by 11:59 p.m., Sept. 4. Make sure to access the Blackboard grade book to check your score. You will receive a zero for each lab you miss due to an incomplete safety certification.

Preparation: You are expected to read the laboratory experiment and complete the pre-lab exercises before coming to lab. It is recommended that you set up an outline or work plan for the experiment as part of your preparation. Required outlines or unannounced quizzes are possible if instructors find that many students are not preparing in advance for lab.

You are expected to arrive on time, properly dressed, and prepared for lab work. If you arrive at lab more than 10 minutes late or improperly dressed, then you will be considered unprepared to do the lab work and will be asked to leave the lab. You will receive no score for that lab and it will count as a fail-to-complete lab.

Pre-lab: Pre-lab exercises are due promptly at the beginning of your scheduled RECITATION period. If your recitation is after your scheduled lab period, you will hand it in within the first 10 minutes of your lab period. For all other sections, if you hand in your pre-lab within the first ten minutes of your lab period, you are eligible to receive a maximum of 50% of the credit for that pre-lab assignment. If you do not hand in your pre-lab or if your pre-lab exercises are not at least 75% complete, you will not be allowed to participate in the lab session and will receive a zero on the lab session. You must include a hand-written procedure for the upcoming lab as part of your pre-lab. Failure to include the procedure will result in the loss of points.
Working With a Lab Partner or Group  You will be working with a partner or group for most of the laboratory projects. Each pair or group will turn in a single group lab report unless otherwise stated. While we encourage you to discuss concepts with other members of your class, the lab reports are to be unique efforts by you and your partner or group. You and your partner or group share the responsibility for writing lab reports that honestly reflect your work. It is also your responsibility as a team to ensure that everyone whose name is on the report participated in preparing it. If you are experiencing difficulties within your group, you should notify your instructor early in the semester or as soon as possible so the issue may be resolved.

Lab Reports: Each laboratory report is due at the beginning of lab one week after lab work has been done except where otherwise noted. All reports must be typed on one side of white, unlined paper. All graphs must be computer-generated using a spreadsheet and graphing program such as Microsoft Excel. Additional information about the format for lab reports will be provided in lab. You must follow the lab report format outlined in the laboratory manual.

Late Lab Reports: Fifty percent (50%) of the maximum points will be deducted from the score for ALL team members for all late lab reports. No laboratory reports will be accepted and graded beyond 24 hours after the report is due. It is the group’s responsibility as a team to ensure that everyone whose name is on the report participated in preparing it.

Grading Criteria for Lab Reports: Your lab reports will be graded primarily on correctness and completeness. The following guidelines will apply:

- The report is complete.
- The report is organized correctly.
- The presentation is legible and logical. Headings and subheadings are used to identify or describe the contents of a particular section. Graphs and tables have titles to describe the contents.
- The data analysis and calculations have been done with the data your team collected during the lab period.
- The data analysis, including units of measurements and significant figures, are correct.
- Chemical terms and concepts have been used correctly throughout the report.
- Your conclusions and results are consistent with your data and calculations.
- Data are within acceptable error limits.

Questions about Lab Report Grades: If you have a question about the score on any of your lab reports, first ask your graduate instructor (TA) for clarification. If the graduate instructor (TA) cannot answer your questions, you may take the graded lab report to the lab supervisor, Keelan Trull, in WTHR 327 for possible re-grading. You will need to do this within one (1) week (that is, 7 calendar days) after the graded paper has been returned to the class. The entire lab report will be regraded, not just the part where you think an error has been made.

Lab Ending Times: The graduate instructors (TAs) must close the laboratories by the end of your scheduled lab period (that is, 10:20 AM; 11:20 AM; 2:20 PM; 5:40 PM). At that time all equipment must be cleaned and put away, lab drawers locked and lab reports turned in so the lights can be turned out and the doors closed.
Safety Policies for Chemistry Labs: The safety of everyone in the active learning environment of a lab is taken seriously and your failure to comply with the safety regulations WILL affect your grade. Complying with safety regulations is simply a minimum requirement for being allowed to work and learn in a chemistry lab.

| Compliance with the Safety Regulations is NOT a Matter of Personal Choice or Opinion. |
| Compliance is a REQUIREMENT. |

Safety Goggles: You must wear appropriate and approved safety goggles (not safety glasses) in the laboratory at all times, including the day of check-out. You will be dismissed from lab and lose all credit for an experiment or lose your opportunity to check out if you do not wear your goggles as required. Safety goggles may be purchased at the local bookstores, the chemistry storeroom, or outside WTHR 200 during the first two weeks of the semester.

Appropriate Clothing: Chemistry department regulations state that you must wear clothing in the laboratory that protects your skin from your neck to your ankles and feet when you are sitting, standing or reaching. Shoes that cover your feet entirely are required. Your best option for chemistry lab attire is a t-shirt, jeans without holes, and sneakers with socks. If you attend lab in unacceptable attire, you will be sent home and receive a zero for the lab.

Unacceptable clothing includes, but is not limited to: sleeveless, low-cut (i.e. below the collar bone), bare midriff or tank tops, see-through, transparent or sheer clothing, pants that are ripped or have holes in the fabric of any size that expose your skin, Capri pants, shorts, short skirts, tights, leggings/jeggings, tight exercise pants, open-toed and/or open-heeled shoes (including Crocs, Birkenstocks or other clogs), sandals (with or without socks), ballet flats, slippers, moccasins, or any shoe that does not cover the entire top of your foot, with or without socks.

Gloves: Gloves serve two purposes: they protect your skin from potential contaminants and keep any potential contaminants inside the lab. You will be required to wear protective gloves for many lab activities. When you leave a lab, take the gloves off and throw them away. Get new gloves when you return to lab.

Contact Lenses: Contact lens wearers are encouraged to wear glasses in the laboratory. If you wear contact lenses in the laboratory, you must inform your graduate instructor (TA) of this at the beginning of the semester.

Hair: If your hair is longer than shoulder length you must tie it behind your head in order to avoid accidental contact with open flames or chemicals that might be on the lab bench. Rubber bands are available in the laboratory.

Food and Beverages: You may not eat, drink, or bring food into the laboratory.

Electronics: The only electronics allowed in the lab is that which is being used for instruction.

Handling and Disposal of Hazardous Materials: You will be required to follow the instructions printed in your lab manual or given to you by the graduate instructor (TA) or others for appropriate handling of hazardous materials and disposal of chemical waste.

Lab Clean Up: You are expected to promptly clean up spills and tidy the laboratory before leaving. Ask for help if you are unsure of proper cleaning procedures.
**Changing Sections/Dropping**

<table>
<thead>
<tr>
<th>UNIVERSITY DEADLINES - Fall 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon. Sept. 4: Last day to cancel (drop) a course without it appearing on your record.</td>
</tr>
<tr>
<td>Mon. Sept. 18: Last day to cancel (drop) a course without a grade.</td>
</tr>
<tr>
<td>Tue. Oct. 24: Last day to withdraw a course with a grade of W or to add/modify a course grade of W or to add/modify a course with instructor and advisor signature</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHEMISTRY DEPARTMENT DEADLINES – FALL 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun. Aug. 27: last day to switch lab sections without instructor approval</td>
</tr>
<tr>
<td>Fri. Sept. 1: last day to switch lab sections with instructor approval</td>
</tr>
<tr>
<td>Fri. Sept. 1: last day to add CHM 12901</td>
</tr>
</tbody>
</table>

**Changing Sections:** In order to change a lab section, approval of the professor will be required after the first week of classes. Because of the processes associated with assigned lab drawers and Blackboard and CONNECT enrollment, we will not make a section change for students after week 3 of the semester. If you change sections after you check into a locker drawer, you must check out of your old locker drawer before checking into a drawer in your new section.

**Adding the Course/Late Registration:** Students are usually not permitted to add CHM 12901 after week 2 of the semester (Fri. Sept. 1).

**Dropping the Course/Lab Check-out:**
If you drop the course by September 16 you do NOT need to formally check out of the laboratory. After that date, you MUST check out with your TA to avoid a penalty fee.

If you drop CHM 12901 after that date, it is your responsibility to check out of your assigned drawer during the next scheduled lab period or during the regularly scheduled Check-Out. If you do not check out immediately, then go to lab at the regularly scheduled starting time during lab check-out as listed on the lab schedule and check out of your locker drawer. **You will need to be properly dressed for laboratory work and wear safety goggles through the entire check-out process.**

**Failure to Check-Out of Lab:** For anyone who does not check out of a lab locker drawer by the scheduled or designated time:
- his/her padlock will be cut (this may also happen for students who arrive late on check-out day)
- he/she will be charged a $45 fee and
- he/she forfeits the right to determine the acceptability of all locker drawer equipment and will be charged for items found to be unacceptable, i.e. dirty, broken, chipped, etc.

**Academic Integrity:** Your integrity is your greatest asset.

In CHM12901, academic integrity means “doing your own work” at all times. Discussion of chemical concepts is encouraged, but sharing your answers and work on social media for the express purpose of letting other students copy it is not acceptable. Such a use of technology does not help you learn the material and is considered academic dishonesty.

Academic dishonesty (i.e. cheating) is a serious offense, so we hope that cheating never arises as a problem in this course. The Office of the Dean of Students publication, Academic Integrity: a Guide for Students, is an excellent summary of expectations for Purdue students and is available at: [http://www.purdue.edu/odos/osrr/academic-integrity/index.html](http://www.purdue.edu/odos/osrr/academic-integrity/index.html)
Consequences: In CHM 12901, academic dishonesty will result in a score of zero for that activity plus a report to the Office of the Dean of Students. Academic dishonesty could result in a grade of “F” in the course plus a report to the Office of the Dean of Students.

Definitions: Plagiarism and unauthorized collaboration are prohibited in CHM 12901.

- **Plagiarism**: “using the exact language of someone else without the use of quotation marks and without giving proper credit to the author” or “stealing someone else’s ideas and presenting them as your own” (from ODOS brochure referenced above).

- **Unauthorized collaboration**: copying directly from another student’s work (e.g. pre-lab) or not contributing equitably to the group or pair’s effort in lab

Examples of academic dishonesty: While the following list of examples of academic dishonesty is not complete, the examples are provided for your information. If you have any questions at all about permissible behavior, save yourself some grief and ask before acting.

- Copying or possessing an unauthorized crib (written or electronic) during an exam
- Copying from another student’s exam OR allowing another student to copy from your exam.
- Copying lab data or lab reports (part or all). This includes electronic files as well as paper copies.
- Not generating your own charts and graphs.
- Giving your lab report to someone else to copy.
- Changing data for a lab project to fit the perceived answer.
- Using or reporting someone else’s data in a report as if they were your own.
- Working together on pre-lab exercises, but not putting the work in your own “style.”
- Submitting a lab report or other work that you did not do.

Purdue’s Honor Pledge: “As a Boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.”

[https://www.purdue.edu/provost/teachinglearning/honor-pledge.html](https://www.purdue.edu/provost/teachinglearning/honor-pledge.html)

Mental Health: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and [http://www.purdue.edu/caps/](http://www.purdue.edu/caps/) during and after hours, on weekends and holidays, or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.
How Do I Learn From Lectures?

You can't learn from lectures if you do not attend them or do not think about the information as it is presented during lectures.

You are responsible for all material covered and announcements made in lectures.

**Before Class**
- Complete the assigned reading and review the notes from the previous class.
- Download and print any student notes for lecture from the course Blackboard site.

**During class**
- Write the date of the lecture on the student notes at the beginning of class if it is not on the first slide.
- Write information that is discussed in lecture but is not on the notes. The professor will give more information than is on the notes.
- Try to answer all the questions that the professor may present.
- Write down each step of every problem or example even if you do not understand the step. You can always ask about it later.
- Write a question mark next to things you don't understand so you can return to them after class.
- Use shorthand or abbreviations so that you can write quickly, but understandably.

**After Class**
- Review your notes while things are still fresh in your mind.
- Check your textbook in order to understand those items that you did not understand and marked in lecture. If necessary, attend office hours with any CHM 12901 graduate instructor (TA) to help you.
- Never miss lecture. Chemistry is cumulative. What is presented tomorrow depends upon your knowledge of what was covered today. If you will miss class, then get a friend to take notes for you.
- It will take you at least two hours out of class for every hour we spend in class in order to study and learn the material. This means about 8 hours of distraction-free studying and working with chemistry each week. You may spend this time working on your lecture notes, reading the text, studying the required material, doing CONNECT homework, studying for exams, or other things. You may find yourself spending more than 8 hours per week if your math skills need improvement or if it has been a few years since you took a chemistry course. If you are committed to your goals and dreams then dedicate yourself to spending the necessary time to study and do well.
- Complete copies of lecture notes will be available in the Chemistry Resource Room (WTHR 117) within a day or two following the lectures. However, copies of these notes are not a substitute for attending lectures.

Finally, your ability to understand what you are currently learning may depend on your already having mastered earlier material. So, study chemistry every day and correct your mistakes as they occur.
**When Should I Do Homework?**

Your assigned homework is considered to be a minimum requirement for keeping focused and learning the material in each chapter. You should practice solving additional problems from the text similar to those assigned and the additional (optional) problems available on CONNECT.

The following guidelines should be helpful if you want to do well in a technical course such as CHM 12901 which will probably involve relearning concepts or learning concepts that you did not have in your high school chemistry course. Learning new material requires constant re-enforcement, which means you may have to change your study habits.

- Read the assigned pages in the textbook before you attempt any of your homework problems.

- Do some work in chemistry every day. Work at least two chemistry problems each day. If you are drawing a blank about the problem after 10-15 minutes, go on to another a problem. Seek help from a CHM 12901 graduate instructor (TA) the next day during office hours. After a day or so, solve related problems in the text.

- Even though CONNECT usually asks for your final answer only, it is important that you write down your complete problem solutions. You can fool yourself into believing you understand if you do not write your steps. You must practice if you are going to be proficient and efficient during exam times!
Week 1:  
Chapter 1: All sections; Key Skills (pp. 28 – 29); Appendix 1 (pp.A1-A4)
Chapter 2: Sections 2.1, 2.3, 2.5, 2.6, and 2.7; Key Skills (pp. 60– 61)
Chapter 5: Section 5.10

Week 2:  
Chapter 3: Sections 3.1, 3.6 – 3.10; Key Skills (pp. 112 – 113)

Week 3:  
Chapter 4: All sections; Key Skills (pp. 153 – 154)
Chapter 5: Sections 5.1, 5.5, 5.8 – 5.9

Week 4:  
Chapter 5: Sections 5.2 – 5.4, 5.6 – 5.7
Chapter 6: All sections; Key Skills (pp. 238 – 239)

Week 5:  
Chapter 7: Sections 7.1, 7.2, 7.4, 7.5, 7.6; Key Skills (pp. 296 – 297)

Week 6:  
Chapter 7: Section 7.3
Chapter 12: Sections 12.1, 12.2, 12.5 and 12.6; Key Skills (pp. 508 – 509)
Chapter 13: Sections 13.1, 13.4 and 13.5

Week 7:  
Chapter 8: Sections 8.1 – 8.4; Key Skills (pp. 340 – 341)
Chapter 9: Section 9.5
Chapter 19: Sections 19.1 – 19.4

Week 8:  
Chapter 19: Sections 19.5 – 19.7

Week 9:  
Chapter 19: Section 19.8
Chapter 2: Section 2.4
Chapter 20: Sections 20.1, 20.2 (Only *Types of Nuclear Decay*), 20.3, 20.4, 20.7, 20.8; Key Skills (pp. 927 – 928)

Week 10:  
Chapter 15: Sections 15.1-15.3, 15.4 (Only *Using Q and K to Predict the Direction of Reaction*), 15.5-15.6; Key Skills (pp. 700 – 701)

Week 11:  
Chapter 9: Section 9.1, 9.3, 9.6 (titrations only)
Chapter 23: Section 23.2
Chapter 16: All sections; Key Skills (pp. 710 – 711)

Week 12:  
Chapter 17: Sections 17.1 – 17.3, Key Skills (pp. 817 – 818)

Weeks 13-14:  
Chapter 10: Sections 10.1 – 10.3 & 10.5 – 10.7
Chapter 14: All sections; Key Skills (pp. 607 – 608 & pp. 648 – 649)
Chapter 15: Section 15.4

Week 15:  
Chapter 9: Section 9.4
Chapter 18: Sections 18.1 – 18.4

Week 16:  
Chapter 18: Section 18.5
Week One

Chemistry the Central Science

Learning objectives

- Differentiate between potential and kinetic energy.
- Differentiate between states of matter.
- Determine whether a mixture is heterogeneous or homogeneous.
- Categorize properties of matter as being quantitative or qualitative; physical or chemical; extensive or intensive.
- Recall the common base SI units of measurement and their associated symbols.
- Understand how to use SI unit prefixes.
- Perform conversions between different temperature scales.
- Apply derived units, such as volume and density, to perform calculations.
- Apply significant figure rules in calculations.
- Distinguish between accuracy and precision.
- Utilize conversion factors to conduct unit conversions.
- Apply dimensional analysis toward solving problems with multiple steps or conversions.

Atoms and the Periodic Table

Learning objectives

- Understand the concept of the atom and the nature of an element.
- Identify the location and physical properties of electrons, protons and neutrons in atoms.
- Understand the nature and importance of isotopes.
- Calculate the mass number of an isotope.
- Utilize the mass number of an isotope to determine the number of electrons, protons or neutrons given other relevant information.
- Understand the nature of the atomic mass scale.
- Calculate the average atomic mass of an element given the atomic mass and relative abundance of each of its naturally occurring isotopes.
- Understand the concept of the mole.
- Use the relationships between Avogadro’s number, moles, molar mass and grams to conduct calculations.
- Interconvert between mass, moles and number of atoms.
Week Two

Quantum Theory the Electronic Structure of Atoms

Learning Objectives

- Understand the concept of atomic orbitals.
- Understand how electron density is related to the shape of atomic orbitals.
- Provide the meaning of each type of quantum number (principal, angular momentum, magnetic and electron spin).
- Assign allowable values for each quantum number.
- Arrange atomic orbitals based upon energy levels.
- Understand how to assign quantum numbers to electrons.
- Be able to construct electron orbital diagrams.
- Determine the full and condensed electron configuration of an atom.
- Understand how to use the periodic table to determine the electron configuration of an atom.
Week Three

Periodic Trends of the Elements

Learning Objectives

- Explain how elements are arranged in the periodic table.
- Use the location of an element in a periodic table to predict some of its characteristics (i.e. metal, non-metal, transition metal, representative/main group elements)
- Utilize the periodic table to determine the electron configuration of an element. Be able to do both complete and condensed forms.
- Describe the importance of valence electrons to chemical characteristics.
- Define effective nuclear charge, atomic radius, ionization energy, and electron affinity.
- Predict differences in effective nuclear charge, atomic radius, ionization energy, and electron affinity between elements using periodic trends.
- Predict the charge of an ion formed from a main group element.
- Determine the electron configurations of ions of main group and d-block elements.
- Predict the sizes of ions relative to atoms of the same element.
- Define isoelectronic species and arrange a series of isoelectronic species according to ionic/atomic radius.
Weeks Three & Four

Ionic and Covalent Compounds

Learning objectives

- Define compounds and molecules.
- Calculate the molecular weights of molecules and compounds.
- Calculate the percent composition by mass and molecular/formula/molar mass of a compound.
- Use the relationships between Avogadro’s number, moles, molar mass and grams to perform calculations involving molecules and compounds.
- Interconvert between mass, moles and number of particles.
- Understand the laws of definite proportions and multiple proportions.
- Determine the empirical formula of a compound from percent composition.
- Utilize the empirical formula and molar mass to determine the molecular formula of a molecule or compound.
- Understand three types of bonding: ionic, metallic, covalent.
- Define ionic bonding and provide examples of compounds that contain ionic bonds.
- Understand lattice energy and how ion charge and ion size affect its magnitude.
- Name ionic compounds.
- Prepare Lewis dot symbols of elements and ions.
Week Four

Representing Molecules

Learning objectives

- Define the octet rule as it relates to Lewis structures of compounds.
- Apply rules for drawing Lewis structures toward determining the Lewis structure of compounds.
- Determine the polarity of a bond using differences in electronegativity.
- Define electronegativity, dipole moment, partial charge, and percent ionic character.
- Determine the formal charge on the atoms in a Lewis structure.
- Use formal charges to identify the most likely structure of a compound when more than one Lewis structure can be drawn.
- Define resonance and resonance hybrid and determine the resonance structures of a species.
- Use formal charges to identify the resonance structure of a species that contributes most to the resonance hybrid.
- Determine Lewis structures of species that do not follow the octet rule, including radicals.
- Explain why period 1 and period 2 atoms cannot exceed the octet rule.
- Explain why period 3 atoms and beyond can exceed the octet rule.
- Draw Lewis structures with expanded octets and without expanded octets for species where both are possible.
Week Five

Molecular Geometry and Bonding Theories

Learning objectives

- Use the valence-shell electron-pair repulsion (VSEPR) model to determine the shape of a molecule.
- Define electron domain.
- Describe the difference between electron domain geometry and molecular geometry.
- Understand why deviations from ideal bond angles occur.
- Determine when molecules will be polar or nonpolar.
- Use valence bond theory to describe the bonding in molecules.
- Predict the hybridization of molecules to explain bonding in molecules.
- Describe the bonding in molecules containing double and triple bonds.
Week Six

Intermolecular Forces and the Physical Properties of Liquids and Solids

Learning objectives

- Understand how molecular polarity affects a molecule’s interactions with itself and other molecules.
- Understand and be able to describe the different types of intermolecular forces:
  - Induced dipole/Induced dipole (London forces/Dispersion forces)
  - Hydrogen bonding
  - Ion-dipole interactions
  - Dipole/induced dipole interaction
  - Ion/induced dipole interaction
- Identify the intermolecular forces present in a given substance.
- Define vapor pressure, boiling point,
- Rank molecules based upon relative strength of intermolecular forces as well as surface tension, viscosity and vapor pressure.
- Understand intermolecular forces in biological molecules such as DNA and proteins.

Physical Properties of Solutions

Learning objectives

- Define solubility.
- Describe the three types of interactions that determine the extent to which a solute is dissolved in solution.
- List and describe the factors that affect the solubility of a solute.
- Identify molecules that will be soluble in each other.
- Identify polar and non-polar compounds.
- Understand the hydrophobic effect.
- Understand detergent micelles and why they form.
- Understand why and how the lipid bilayer in membranes forms.
- Understand how temperature and pressure affect solubility.
- Understand and describe the colligative properties: vapor pressure lowering, boiling point elevation, freezing point depression, and osmotic pressure.
Week Seven

Chemical Reactions

Learning Objectives

- Define chemical reaction, chemical equation, reactant, and product.
- Recognize physical states of reactants and products in a chemical equation.
- Balance chemical equations by changing the stoichiometric coefficients.
- Use combustion analysis to determine the empirical formula of a compound.
- Determine amounts of reactant required or product formed using stoichiometry.
- Identify the limiting and excess reactants in a reaction.
- Define and calculate theoretical yield, actual yield, and percent yield.
- Calculate the molarity of a solution.
- Determine the concentration of a solution that has been diluted in addition to applying dilution principles toward serial dilutions.
Chemical Kinetics

Learning Objectives

- Describe the main factors that can increase the rate of a reaction.
- Describe the collision theory of chemical kinetics.
- Define effective collision and activation energy.
- Determine the average rate of a reaction given appropriate data.
- Determine the instantaneous rate of a reaction given a graph.
- Use the stoichiometry of a reaction to express the rate of a reaction in terms of a reactant or product.
- Define reaction order and provide examples of a 0th, 1st, and 2nd order reaction rate law.
- Produce the rate law of a reaction given experimental initial rate data.
- Determine the units of the rate constant $k$ for a reaction.
- Determine the order of a reaction from its rate law.
- Determine the concentration of reactant using the integrated rate law for the reaction.
- Calculate the half life of a reaction.
- Calculate the amount of starting reactant left after a certain period of time given the half life and order of the reaction.
- Determine the rate constant or activation energy of a reaction using the Arrhenius equation.
- Define reaction mechanism.
- Determine the rate law of a reaction given its rate-determining step.
- Provide the requirements for the steps of a proposed mechanism.
- Determine if a proposed reaction mechanism is plausible.
- Define elementary reaction.
- Define a catalyst and an enzyme and understand how they speed up reactions by lowering the activation energy.
- Understand the transition state analog theory of enzyme-substrate binding.
- Understand the non-covalent interactions that are responsible for enzyme-substrate binding.
- Understand the Michaelis–Menten equation and how it was derived.
- Describe the Michaelis–Menten plot in terms of first order and zero order kinetics and understand the concept of enzyme saturation.
- Understand $V_{\text{max}}$ and $K_M$.
- Understand how $K_M$ relates to enzyme affinity for a substrate.
- Understand the Linewer–Burk double reciprocal equation and how it is used to determine $K_M$ and $V_{\text{max}}$.
- Describe how salt, pH, co-factors and temperature affect enzyme activity.
- Understand enzyme inhibitors: competitive, non-competitive and irreversible.
Nuclear Chemistry

Learning Objectives

- List the particles or types of radiation that an unstable nucleus can produce.
- Identify a subatomic particle in a nuclear equation.
- Define alpha and beta particles and gamma rays.
- Define positrons and electron capture.
- Distinguish between chemical and nuclear reactions.
- Demonstrate use of subatomic particles in balancing nuclear reactions.
- List the rules for nuclear stability and use them to predict whether a particular nucleus is stable.
- Use the half-life of a radioactive decay in calculations.
- Provide examples of the use of isotopes in science and medicine.
Chemical Equilibrium

Learning Objectives

- Define reversible process.
- Define equilibrium as the state when the rate of the forward reaction equals the rate of the reverse reaction.
- Write the equilibrium constant expression for a given reaction.
- Understand that solids and pure liquids do not affect the position of equilibrium.
- Determine the value of the equilibrium constant given equilibrium concentrations of reactants and products.
- Differentiate between equilibrium constant, K, and reaction quotient, Q.
- Use the equilibrium constant to predict the relative amounts of reactants to products at equilibrium.
- Predict the direction of a reaction given initial concentrations of reactants and products and the value of the equilibrium constant.
- Give in your own words the meaning of Le Châtelier’s principle.
- Apply Le Châtelier’s principle toward determining the shift of a reaction at equilibrium given a change in one of the following: removal or addition of reactant or product, change in volume or pressure, and temperature change.
- Calculate the equilibrium concentration of reactants or products given initial concentrations.
- Construct an equilibrium table for a reaction and use it to determine equilibrium, initial or final concentrations of a reactant or product.
Weeks 11 & 12

Acids, Bases and Buffers

Learning Objectives

- Understand organic functional groups, especially those that act as acids and bases.
- Identify weak and strong acids and bases.
- Identify conjugate acid-base pairs and understand how they differ by one proton.
- Understand the difference between monoprotic, diprotic or triprotic acids.
- Understand how amino acids act as weak acids alone and in peptides and proteins.
- Understand the concept of a salt and identify the spectator/counter ions in a reaction
- Identify electrophiles and nucleophiles in acid base reactions.
- Use equilibrium arrows and electron pushing mechanism arrows in acid base reactions.
- Predict the net direction of an acid-base reaction.
- Understand how \([H_3O^+]\) and pH define whether a solution is acidic, basic, or neutral.
- Understand how the strength of an acid, and thus pH, relates to the extent of its dissociation into ions in water and how that reaction is expressed by the acid- dissociation constant \(K_a\).
- Use p-functions to express \([H_3O^+]\) and \(K_a\) as pH and \(pK_a\), respectively.
- Understand \(pK_a\) as the pH where 50% of the acid is deprotonated.
- Calculate pH for monoprotic and polyprotic acids from \(pK_a\) and initial acid concentration and use the pH of a weak acid solution to calculate the \(pK_a\).
- Calculate the percent ionization of biologically relevant weak acids and drug molecules at different pHs.
- Compare and rationalize the strengths of monoprotic and polyprotic acids based on the stability of the conjugate base using the following criteria: Electronegativity of the atom in the conjugate base with the charge, bond dissociation energy, inductive effects and resonance effects.
- Understand why amines and weak-acid anions act as weak bases in water.
- Understand the concept of \(K_b\) – the base dissociation constant and its relationship to base strength.
- Draw and interpret titration curves of strong acids with strong bases, weak acids with strong bases and weak base with strong acids.
- Calculate pH values at the start of a titration and at the equivalence point.
- Understand how the pH at the equivalence point is determined by the species present.
- Understand why the pH at the midpoint of the buffer region equals the \(pK_a\) of the acid
- Understand how the titration curve of a polyprotic acid has a buffer region and equivalence point for each ionizable proton.
- Understand how buffers work to resist changes in pH and why the relative concentrations of HA and \(A^-\) determine the acidity or basicity of their solution
- Select the appropriate weak acid to make a buffer of given pH.
- Understand and use the Henderson-Hasselbalch equation to calculate buffer pH.
- Understand how to prepare a buffer with a given pH using the \([A^-]/[HA]\) ratio to make a buffer that is effective only within ±1 pH unit of the \(pK_a\) of the weak acid.
- Use stoichiometry and buffer problem-solving techniques to calculate the effect of added \(H_3O^+\) or \(OH^-\) on buffer pH.
- Understand how blood pH is maintained physiologically.
Weeks 13 & 14

Thermochemistry: Energy Changes in Chemical Reactions
Thermodynamics: Entropy, Free Energy and Equilibrium

Learning objectives

- Identify the system and surroundings for a given experiment.
- Identify a process as endothermic or exothermic.
- Understand the units used to measure energy including joules and calories.
- Identify a system as being open, closed, or isolated.
- Understand the concept of state functions and be able to identify state functions and non-state functions.
- Define work and heat and understand their sign conventions.
- Understand enthalpy and enthalpy changes.
- Calculate the enthalpy change of a reaction and understand how it is dependent upon stoichiometric amounts of products and reactants.
- Apply Hess’ Law in the determination of the heat of reaction of a multi-step process.
- Understand the nature of the standard state, particularly as it applies to standard heat of formation.
- Use the standard heats of formation of products and reactants to calculate the enthalpy change of a reaction.
- Distinguish between a spontaneous and nonspontaneous process and cite examples of each.
- Define entropy.
- Describe the conditions for standard entropy.
- Calculate the standard entropy change for a given reaction.
- List key trends in standard entropy of atoms and molecules.
- Predict the sign of ΔS of a process and use the sign to indicate whether the system has undergone an increase or decrease in entropy.
- Calculate ΔSsurr given ΔSys and temperature.
- Give in your own words the second law of thermodynamics.
- Determine whether a process is spontaneous given ΔSsurr and ΔSys.
- Give in your own words the third law of thermodynamics.
- Define Gibbs free energy.
- Use ΔH and ΔS to calculate ΔG and determine whether a process is spontaneous.
- Predict the sign of ΔG given ΔH and ΔS.
- Define standard free energy of formation.
- Calculate the standard free energy of a given reaction.
- Calculate ΔG and ΔG° of a reaction at a temperature given Q or K.
- Explain, using thermodynamic terms, how energetically unfavored metabolic reactions can occur.
Weeks 15 & 16

Chemical Reactions in Aqueous Solutions  Electrochemistry

Learning Objectives

- Identify the various components of an oxidation-reduction reaction including reducing/oxidizing agents and half-reactions.
- Apply oxidation number rules toward determining the oxidation number of each element in a compound or polyatomic ion.
- Determine the oxidation state of carbon atoms in organic compounds.
- Utilize the activity series to determine whether a reaction occurs between a metal and ions of another metal.
- Predict the balanced reaction for an oxidation-reduction reaction.
- Use the half-reaction method to balance oxidation-reduction reactions in either acidic or basic conditions.
- Understand the function of the citric acid cycle/Kreb’s cycle in metabolism.
- Describe the roles of NAD+ and FAD in catabolic reactions.
- Define dehydrogenase and describe the roles of these enzymes in metabolism.
- Define key electrochemical terms: galvanic cell, anode, cathode and salt bridge.
- Explain the importance of the standard hydrogen electrode (SHE).
- Determine the standard cell potential and the spontaneous cell reaction for a given chemical combination.
- Calculate $E^{\circ}_{\text{cell}}$ of a reaction given the value of $\Delta G$ and $K$ and interconvert between these three.
- Use the Nernst equation to calculate the $E_{\text{cell}}$ of a cell under non-standard state conditions.
- Understand the role of redox reactions in the electron transport chain.
- Understand how ATP is generated by oxidative phosphorylation.
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<td>Physical Properties of Solutions - Concentrations and Solubility; Colligative Properties</td>
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**Week 4**

Chapter 3: Biologically Important Molecules: Amino Acids, Proteins and Carbohydrates

**Week 5**

Chapter 4: Biologically Important Molecules: Lipids and Nucleic Acids

**Week 6**

Chapter 5: Molecular Geometry and Polarity

HW#3: Due Sun. Sept. 17

HW#4: Due Sun. Sept. 24

HW#5: Due Sun. Oct. 1
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<td>18 Chemical Equations &amp; Stoichiometry</td>
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**Reminders:**
- Lab 10: Due Sun. Nov. 19
- HW#12:Due Sun. Dec. 3
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