### Syllabus CHEM 1412: General Chemistry II

Spring 2018

| Section:             | 02                          | <b>Time:</b> 10:00-10:50 MWF | Room: CFS 121          |
|----------------------|-----------------------------|------------------------------|------------------------|
| Instructor:          | Dr. Christopher (Kit) Zall  | Email: zall@shsu.edu         | Office: CFS 304        |
| <b>Office Hours:</b> | Tuesday, Wednesday, 3:30-4: | 30 pm, or by appointment     | <b>Phone:</b> 294-1525 |

#### **Required Texts and Course Materials:**

- *Chemistry, The Central Science,* 14<sup>th</sup> Edition, Brown, LeMay, Bursten, Murphy, Woodward, and Stoltzfus (or other recent edition)
  - o ISBN 978-0321910417 (print book)
- General Chemistry Laboratory Manual for Chemistry 1412, SHSU Faculty and Staff
- *Modified MasteringChemistry* access code for Brown/LeMay/Bursten, 14<sup>th</sup> Ed.
  - ISBN 978-0-13-455634-5 (standalone access to *MasteringChemistry* only)
  - ISBN 978-0-13-456223-0 (packaged with e-textbook)
    - Register for course zall44161
  - Access to the online homework system is **required** for this course. This can be purchased through the publisher or separately, through e.g. Amazon. Before purchasing an access code, you can get temporary access for 14 days.

**Overview:** This course is the second semester of the two-course General Chemistry sequence, introducing the processes underlying the behavior of matter and chemical reactions. Areas of specific focus are: the properties of gases, liquids, and solutions; rates and equilibria of chemical reactions; acid/base and solubility equilibria; the thermodynamic relationships between enthalpy, entropy, and equilibrium; electrochemical reaction.

An associated laboratory section counts for 20% of your grade in the course. See your laboratory syllabus (available on Blackboard) for details regarding the laboratory portion of the course.

| Im          | portant Dates and Events              |                            |  |
|-------------|---------------------------------------|----------------------------|--|
| Date        | Event                                 | Coverage                   |  |
| Feb. 1      | Last day to drop without "Q" Grade    |                            |  |
| Feb. 5      | First week of labs – see lab syllabus |                            |  |
| Feb 19      | Midterm Exam #1                       | Ch. 10, 11, 13             |  |
| (Tentative) |                                       |                            |  |
| March 12-16 | No Class – Spring Break               |                            |  |
| March 26    | Midterm Exam #2                       | Ch. 14, 15                 |  |
| (Tentative) |                                       |                            |  |
| March 30    | No Class – Good Friday                |                            |  |
| April 6     | Last day to drop with a "Q" Grade     |                            |  |
| April 20    | Midterm Exam #3                       | Ch. 16, 17                 |  |
| (Tentative) |                                       |                            |  |
| May 4       | Last day of class                     |                            |  |
| May 7       | Final Exam                            | Non-cumulative: Ch. 19, 20 |  |
|             | 10:30-12:30 pm                        |                            |  |

# Grading Breakdown: You are responsible for keeping track of your grade in this class.

Grades for individual items will be posted on Blackboard periodically as appropriate, but Blackboard will not calculate your overall grade, and your professor may not respond promptly, or at all, to requests for your overall grade. You can calculate your grades on your own using the weighting schemes listed below.

| Gradin           | g Breakdown | : Overall          |   | Grading Break                                       | lown: Lectu | re Section |
|------------------|-------------|--------------------|---|---|-------------|------------|
| Item             | % of grade  | Weighting Factor   |   | Item  | % of        | Weighting  |
| Exam 1           | 15%         |                    |   |   | lecture     | factor     |
| Exam 2           | 15%         | 0.6*(total exam%)  |   |   | grade       | (lecture)  |
| Exam 3           | 15%         |                    |   | Exam Scores   | 75%         | 0.75       |
| Final Exam       | 15%         |                    |   | Class   | 6.25%       | 0.0625     |
| Class Attendance | 5%          | 0.05*(attendance%) | _ | Attendance  |             |            |
| Online           | 15%         | 0.15*(HW%)         |   | Online  | 18.75%      | 0.1875     |
| Homework         |             |                    |   | Homework  |             |            |
| Laboratory       | 20%         | 0.2*(lab%)         |   | Total: 100% of lecture grade (80% of overall grade) |             |            |
| Total            | 100%        |                    |   |   |             |            |

Calculating your grade using weighting factors

- Your grade is the sum of your scores (as a percentage) for the items listed above multiplied by their respective weighting factors.
- Overall, the exam scores are worth 60% of your grade (weighting factor 0.6), attendance is worth 5% (weighting factor 0.05), homework is worth 15% (weighting factor 0.15), and the laboratory section is 20% (weighting factor 0.2).
  - For example, if you have a 75% exam average, 100% for attendance, 90% for homework, and 85% for lab, your overall grade would be: 0.6\*(75%) + 0.05\*(100%) + 0.15\*(90%) + 0.2\*(85%) = 80.5%
  - In the same scenario, your *lecture* grade would be: 0.75\*(75%) + 0.0625\*(100%) + 0.1875\*(85%) = 78.4%
    - Using these weighting factors makes it easier to keep track of your scores throughout the term than using simple point totals. You can calculate your score in the middle of the term (when you might have only one or two exam scores available) as easily as you could at the end of the term.

### Lecture and Lab Grades

- Note that the lecture section of this course (exams, homework, and attendance) is worth 80% of your overall grade and the laboratory section is worth 20%. You must have a passing grade in each of these sections, lecture and lab, to pass the class.
  - For example, if you have an 80% in the lecture section and 60% in the lab, your overall grade would be 0.8\*(80%)+0.2\*(60%) = 76%. However, because the 60% for the lab is not a passing grade, you would not pass this course and would be assigned a D overall. This is a department-wide policy.
    - Laboratory grades are kept separately: see your laboratory syllabus for details on these grades and your lab instructor for pass/fail cutoffs.

### Cutoffs for letter grades:

 $A: \geq \!\!89.5\% \quad B: \ \geq \!\!79.5\% \text{ to } < \!\!89.5\% \quad C: \geq \!\!69.5\% \text{ to } < \!\!79.5\% \quad D: \ \geq \!\!59.5\% \text{ to } < \!\!69.5\% \quad F: < \!\!59.5\%$ 

In this course, all grading cutoffs will be applied firmly and fairly, i.e. equally for all students. No special treatment will be given because you showed effort, or improvement, or because you need to pass this class, or for any other reason.

• It would not be fair or ethical to arbitrarily boost any student's grade, nor to offer extra credit to any student without giving the same opportunity to the rest of the class; likewise, it would not be fair or ethical for you to even *ask* for such treatment.

#### **Exams and Exam Scheduling:**

There will be three midterm exams as well as a final exam. Tentative midterm dates and the date of the final exam are listed on the first page of this syllabus, along with the grading breakdown for the course. The actual dates of the midterms will be announced at least two weeks ahead of time.

- No makeup or alternative exam dates will be allowed. Exams missed for unexcused absences will result in a grade of 0.
  - Excused absences must be documented and discussed with Dr. Zall beforehand. In the event of an emergency that can be documented, Dr. Zall will discuss possible remedies, potentially including modification to the grading scheme to allow final exam performance to compensate for the missed exam score.
  - Dr. Zall reserves the right to assign a zero should he determine that the circumstances did not justify the absence.
- The dates of the midterm exams are tentative and may be postponed, but the date of the final exam cannot be changed. Make your family/work/vacation plans <u>now</u> to avoid conflicts.

### **Class Attendance:**

Attendance is graded and counts for 5% of your total grade.

- You must sign the class roster that is passed around at the start of each class period to record your attendance. Failure to sign the roster will count as an absence.
  - If the roster is not passed around in class, that day's attendance is not recorded and will not count towards your total.
  - Being disruptive in class, or sleeping/watching videos/otherwise visibly not participating in class, will be counted as an absence.
- You get four "free absences," i.e. students with four or fewer absences at the end of the course will receive full credit for class participation.
  - No other "excused absences" will be granted, except for regularly scheduled, University-sanctioned activities such as sports, band, or similar activities.
  - $\circ~$  If you have four or fewer recorded absences at the end of the term, you receive a 100% attendance score.

- If you have more than four absences, your attendance grade will be calculated as a percentage of the number of classes attended out of the number of total classes (*i.e.* 32 classes attended out of 40 total = 80%, or 40 points).
- Dates with exams do not count towards your attendance total.

# Mastering Chemistry Online Homework:

- Graded online homework assignments will use the *Mastering Chemistry* online program.
- These count for 150 points altogether (15% of your total grade).
  - The number of points for each individual assignment may vary but should be between 5-10 points. At the end of the semester, if the total number of points from these assignments does not equal 150, your percentage of the total will be converted to the corresponding percentage of 150, rounding up to the nearest whole number. For instance, if 200 points' worth of homework problems have been assigned and you have earned 100 points from these assignments, your final homework grade would be scaled to 75 points of the 150 possible.
- You are encouraged to work through the graded homework problems in groups. However, make sure that you understand how to solve the problems – do not simply copy your group members' work. Doing so will leave you unprepared for the exams and unlikely to pass the course.

#### **Additional Resources:**

• Supplemental Instruction (SI) Review Sessions

Optional review sessions will be held once a week, led by a student SI Leader who has passed this class in a previous term. The SI Leader will attend the lectures and then hold interactive study sessions aimed at developing a deeper understanding of the course material, through worked problems and group discussions. This is free, non-graded help on the course. Further details will be provided in class once a schedule has been worked out.

Mastering Chemistry Online Dynamic Study Modules

In addition to the graded assignments, online practice problems and tutorials for many topics can be found at the course *Mastering Chemistry* site.

- The Chemistry Department provides free, drop-in tutoring sessions.
  - Tutors do not become available until the start of labs, typically 2-3 weeks after the first week of lecture
  - Tutor schedules will be posted on the Blackboard site for the *lab* portion of this course when available (typically 2-3 weeks after the first week of lecture).

### Accommodation:

If you have a disability that might affect your performance in this class, you should contact the Services for Students with Disabilities (SSD) at the SHSU Counseling Center (phone: 936-294-1720) to apply for accommodations. Make an appointment with the course instructor after SSD has approved your accommodations.

### Academic Dishonesty:

Any student found guilty of dishonesty in their academic work will be subject to disciplinary action. The University may initiate disciplinary proceedings against a student accused of any

form of academic dishonesty including, but not limited to, cheating, plagiarism, and the abuse of resource materials. If the instructor believes that an assignment, exam, or laboratory report is a copy of another student's work, BOTH copies will receive a grade of 0%, and disciplinary action will be considered.

#### **Course Outline and Learning Objectives:**

We will cover the material in Chapters 10-23 in the textbook, omitting Chapter 12, 18, 21, and 22. On average, we will cover one chapter every four class periods, or a little over a week. The course schedule listed below is **tentative** and subject to change.

More up-to-date information, including readings and suggested problems from the end of the chapter will be given in each day's lecture slides, which are also available on Blackboard. At the end of each chapter, a review worksheet will be posted on Blackboard with sample problems similar to the ones that you will find on the exams. These practice problems are highly recommended, but they will not be graded.

| Week | Date    | <b>Chapter/Section</b> | Торіс  |
|------|---------|------------------------|--|
| 1    | 1/17/18 |                        | Canceled due to weather                              |
|      | 1/19/18 |                        | Intro/Review   |
| 2    | 1/22/18 | 10.1, 10.2             | Properties of Gases and Gas Pressure                 |
|      | 1/24/18 | 10.3                   | The Gas Laws   |
|      | 1/26/18 | 10.4                   | The Ideal Gas Equation                               |
| 3    | 1/29/18 | 10.5, 10.6             | Applications of the Ideal Gas Equation, Gas Mixtures |
|      |         |                        | Kinetic-Molecular Theory and Real Gases              |
|      | 1/31/18 | 10.7-10.9              |  |
|      | 2/2/18  | 11.1,11.2              | Intermolecular Forces                                |
| 4    | 2/5/18  | 11.3,11.4              | Properties of Liquids, Phase Changes                 |
|      | 2/7/18  | 11.5, 11.6             | Vapor Pressure, Phase Diagrams                       |
|      | 2/9/18  | 13.1, 13.2             | Solutions and Solubility                             |
| 5    | 2/12/18 | 13.4                   | Solution Concentrations                              |
|      | 2/14/18 | 13.5                   | Colligative Properties, Pt. 1                        |
|      | 2/16/18 | 13.5                   | Colligative Properties, Pt. 2/ Review of Material    |
| 6    | 2/19/18 |                        | Exam 1: Chapters 10, 11, 13                          |
|      | 2/21/18 | 14.6                   | Kinetics and Reaction Mechanisms                     |
|      | 2/23/18 | 14.1, 14.2             | Reaction Rates                                       |
| 7    | 2/26/18 | 14.3                   | Rate Laws  |
|      | 2/28/18 | 14.4                   | Integrated Rate Laws                                 |
|      |         | 14.5, 14.6 14.6,       |  |
|      | 3/2/18  | 14.7                   | Activation Energies and Reaction Coordinates         |
| 8    | 3/5/18  | 14.6, 14.7             | Reaction Mechanisms and Catalysis                    |
|      | 3/7/18  | 15.1,15.2, 15.3        | Equilibrium and Equilibrium Constants                |
|      | 3/9/18  | 15.4, 15.5             | Calculating Equilibrium Constants                    |
| 9    | 3/12/18 |                        | No Class Wook of Spring Prost                        |
|      | 3/14/18 |                        | No Class – week of Spring break                      |

|    | 3/16/18 |                  |   |
|----|---------|------------------|---|
| 10 | 3/19/18 | 15.6             | Applications of Equilibrium Constants               |
|    | 3/21/18 | 15.7             | Le Chatelier's Principle                            |
|    | 3/23/18 |                  | Review of Kinetics and Equilibrium                  |
| 11 |         |                  | Exam 2 (Chapters 14 and 15)                         |
|    | 3/26/18 |                  |   |
|    |         |                  | Acid/Base Equilibria, Arrhenius and Bronsted-Lowry  |
|    | 3/28/18 | 16.1, 16.2       | Theory  |
|    | 3/30/18 | 16.3, 16.4       | Autoionization and pH                               |
| 12 | 4/2/18  | 16.5,16.6        | Strong Acids/Bases vs Weak Acids                    |
|    |         |                  | Relationship between Ka and Kb and the Acidity of   |
|    | 4/4/18  | 16.7, 16.8, 16.9 | Salt Solutions                                      |
|    | 4/6/18  |                  | No Class – Good Friday                              |
| 13 | 4/9/18  | 16.10, 16.11     | Lewis Acids and Bases / Review                      |
|    |         |                  | Common-Ion Effect, Buffers                          |
|    | 4/11/18 | 17.1, 17.2       |   |
|    | 4/13/18 | 17.3             | Acid/Base Titrations                                |
| 14 | 4/16/18 | 17.4,17.5,17.6   | Solubility Equilibria, Solubility and Precipitation |
|    | 4/18/18 |                  | Review of Applications of Equilibrium               |
|    | 4/20/18 |                  | Exam 3 (Chapters 16 and 17)                         |
| 15 |         |                  | Spontaneity and Entropy                             |
|    | 4/16/18 | 19.1,19.2        |   |
|    | 4/18/18 | 19.3,19.4        | Entropy in Molecules and Reactions                  |
|    | 4/20/18 | 19.5, 19.6       | Gibbs Free Energy and Temperature                   |
| 16 |         |                  | Free Energy and the Equilibrium Constant            |
|    | 4/23/18 | 19.7             |   |
|    | 4/25/18 | 20.1, 20.2       | Review and Balancing of Redox Reactions             |
|    | 4/27/18 | 20.3, 20.4       | Voltaic Cells and Standard Cell Potentials          |
| 17 |         |                  | Free Energy and Redox Reactions, Potentials under   |
|    | 4/30/18 | 20.5,20.6        | Nonstandard Conditions                              |
|    |         |                  | Cell Potentials Under Nonstandard Conditions,       |
|    | 5/2/18  | 20.6, 20.7       | Batteries   |
|    | 5/4/18  | 20.8,20.9        | Corrosion, Electrolysis                             |