

**CHEM 1412 General and Quantitative Chemistry II****Faculty contact:**

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Office Hours: MWF 10:00-11:00 am

**Introduction:** *General and Quantitative Chemistry II*. 4 Semester Hours: 2.5 hours of lectures and 4 hours of laboratory per week. This course is part of the University Studies core courses and will meet criteria for laboratory science credits.

**Objectives:** This is the second part of a two-course sequence of general chemistry. The course is designed primarily for the students majoring in sciences or in pre-professional programs. By the end of the course you will be familiar with a range of fundamental chemistry topics including chemical reaction rates, chemical equilibrium, acid-base chemistry, solubility, thermodynamics, electrochemistry, nuclear chemistry, organic chemistry, inorganic chemistry and biochemistry. Chemists deal with these subject areas every day, but these concepts are also crucially important to other branches of science and technology.

**Learning Outcome:**

1. Use LeChatelier's Principle to predict the effects of concentration, pressure and temperature changes on equilibrium mixtures.
2. Balance oxidation-reduction reactions.

**Course Materials:**

Textbook: *General Chemistry*, 9<sup>th</sup> Edition, Ebbing, Gammon, Houghton Mifflin Company, New York, NY, copyright 2009.

*Experiments in General Chemistry*, 9<sup>th</sup> Edition, by R.A.D. Wentworth, published by Houghton Mifflin Company, New York, NY.

A pair of safety goggles and a padlock

Classroom: Lecture Chem 1412.001 M/W/F 9:00–9:50 am in Science 127

Lecture Chem 1412.002 M/W/F 1:00-1:50 pm in Science 122

**Prerequisite:** The student must have completed Math 141 or be concurrently enrolled in math 142 or other higher level courses in mathematics. Students who had adequate high school preparation in mathematics or were exempted from Math 141 will be allowed to enroll with the instructor's consent. Concurrent enrollment of Math 141 with CHEM 1412 generally is not encouraged. Students who are currently enrolled in math remediation courses such as PJCM 300, PJCM 306, or Math 131 will not be eligible for enrollment in CHEM 1412.

**Attendance Policy:** All students are expected to attend classes on a regular basis. The Department of Chemistry adheres to the attendance policy set by the University as stated in the most current Undergraduate Catalog. The attendance record is taken from the **daily sign-in sheet**. A student who is late by more than 5 minutes or fails to sign the sign-in sheet will be counted as missing a lecture. **Excessive absence is defined as missing more than 10% of the lectures or more than 10% of the laboratory sessions without excusable reasons.** Excessive absence will be reported to the Dean of the College and the Dean of Students. In addition, **according to the TAMU-Commerce Procedure A13.02, if a student has excessive absences, the instructor may drop the student from the course.** The instructor will only excuse an

absence if the student provides, with appropriate document, an excusable reason allowed by the TAMU-Commerce Procedure A13.02. Good class attendance will be necessary in order to pass this course.

**Student Conduct Policy:** All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment (see Student's Guidebook, Policies and Procedures, Conduct). Any student engaging in disruptive behavior will be dismissed from class on the first offence. A second offence may constitute dismissal from the course with a failing grade.

**Cheating and other Breaches of Academic Conduct:** Academic cheating, plagiarism, and other forms of academic misconduct may result in removal of the student from class with a failing grade or may in extreme cases result in suspension or expulsion from the University as described in the Code of Student Conduct section of the Student's Guidebook.

**Students with Disabilities:** The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact: **Office of Student Disability Resources and Services, Texas A&M University-Commerce, Halladay Student Services Building, Room 303 A/D, Phone (903) 886-5150 or (903) 886-5835, Fax (903) 468-8148** [StudentDisabilityServices@tamu-commerce.edu](mailto:StudentDisabilityServices@tamu-commerce.edu)

#### **Pointers to Succeed in CHEM 1412:**

1. The lectures in this course will cover topics from Chapters 12 through 23 of the assigned textbook. This material will be covered at the rate indicated by the *Tentative Class Schedule*. *Be sure to read the textbook before coming to the lectures*. The lectures will focus on important chemistry concepts but will not serve as a substitute for reading the textbook. The textbook is a more detailed presentation with a more extensive set of example problems. Chemistry is a physical science and it is imperative to master calculations to pass the course.
2. *Finish your homework promptly*. Even though the homework is not turned in or graded, working the problems will help you succeed in the course. The more problems that you work the better prepared you will be for exams.
3. *Read the experiment carefully before coming to lab*. A Pre-Lab assignment will be due at the beginning of each laboratory session. The Pre-Lab will be graded and account for 25% of the total lab grade. Therefore, it is necessary to read and understand the concepts as well as the procedure involved in the experiment carefully beforehand. The lab report is due at the beginning of the next laboratory session.
4. *Be professional*. 5% of the lab grade is dependent on your behaviors in the lab, such as adherence to the safety rules, keeping your bench neat during the laboratory and cleaning up your laboratory area throughout the lab period.

#### **Grading/Evaluation**

The grade for this course will be derived as follows:

CHEM 1412: Lecture and Laboratory (graded as a single 4-credit hour course.)

Lecture Portion: 75% of course grade

Four examinations      80 % of lecture grade (60% of course grade)

Final Exam              20 % of lecture grade (15% of course grade)

*Late work will not be accepted, and makeup quizzes or exams will not be given.* If you miss an exam, for whatever reason, the points for the missed exam will be placed on your final exam, making your final exam count for a greater percentage of your grade. The final exam will be comprehensive and cover material from Chapters 12-24. Grading will be based on a scale: 100-86 = A; 85-73 = B; 72-60 = C; 59-45 = D; 45-below = F. Dishonest scholarship will earn an automatic zero (0) and initiate prosecution to the fullest extent. Incomplete grades may be given only if the student has a current average  $\geq 70\%$  and is precluded from completion of the course by a documented illness or family crisis.

Laboratory Portion: 25% of course grade. Twelve laboratory reports will be required. The lab report with the lowest score will be dropped. The average of the grade for the rest of the eleven laboratories will constitute the laboratory grade.

|                          |      |
|--------------------------|------|
| Prelab                   | 25%  |
| Conduct, lab cleanliness | 5%   |
| Lab report               | 70%  |
| Total                    | 100% |

### Tentative Lecture Calendar

| Week Starting | Chapter                  | Topics  |
|---------------|--------------------------|---|
| 1/14-1/18     | Chapter 12               | Solutions   |
| 1/23-1/25     | Chapters 12/13           | Solutions/Chemical Equilibrium  |
| 1/28-2/1      | Chapters 13/14           | Rates of Reaction/Chemical Equilibrium  |
| 2/4-2/8       | Chapter 14               | Chemical Equilibrium  |
| 2/11-2/15     | Chapter 14/15            | <b>Exam 1 (Chapter 12-14)</b> /Acids and Bases  |
| 2/18-2/22     | Chapters 15/16           | Acids and Bases /Acid-Base Equilibria   |
| 2/25-3/1      | Chapter 16/17            | Acid-Base Equilibria/Solubility and Complex-Ion Equilibria                                    |
| 3/4-3/8       | Chapter 17               | Solubility/ <b>Exam 2 (Chapter 15-17)</b>   |
| 3/18-3/22     | Chapter 18               | Thermodynamics and Equilibrium  |
| 3/25-3/29     | Chapter 18/19            | Equilibrium/Electrochemistry  |
| 4/1-4/5       | Chapter 19               | Electrochemistry  |
| 4/8-4/12      | Chapter 19               | Electrochemistry / <b>Exam 3 (Chapter 18-19)</b>  |
| 4/15-4/19     | Chapters 23              | Organic Chemistry   |
| 4/22-4/26     | Chapters 23/20           | Organic Chemistry/Nuclear Chemistry   |
| 4/29-5/3      | Chapters 20/21-22        | Nuclear Chemistry/Main Group and Transition Elements(handout) / <b>Exam 4 (Chapter 20-23)</b> |
| 5/10          | <b>Final Examination</b> | <b>Covers chapters 12-23</b>  |

| <b><u>Recommended HW problems and examples</u></b> |
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| Chap. 12: 47, 49, 53, 55, 57, 69                   |
| Chap. 13: 43,45,46,51,55,63,77                     |
| Chap. 14: 35, 43,51,65,73                          |
| Chap. 15: 36,51,53,59,67,79                        |
| Chap. 16: 33,35,38,50,52,75                        |
| Chap. 17: 27,29,37,41,47,59,61                     |
| Chap. 18: 31,35,39,41,45,59,63                     |
| Chap. 19: 35,37,49,54,57,63,66,78,82,86            |
| Chap. 20: 19,33,35,37,39,41,43                     |
| Chap. 23: 27, 37, 38,39                            |

### **Tentative Laboratory Calendar**

| <b>Week</b> | <b>Date</b>     | <b>Experiment</b>   |
|-------------|-----------------|---|
| <b>1</b>    | Jan. 14/16      | Check in equipment, Safety lecture & quiz   |
| <b>2</b>    | Jan. 23/28      | Experiment 12A: A Molar Mass from Freezing Point,   |
| <b>3</b>    | Jan. 30/Feb. 4  | Experiment 12B: Softening Hard Water  |
| <b>4</b>    | Feb. 6/11       | Experiment 13: The Rate of an Iodine Clock Reaction   |
| <b>5</b>    | Feb. 13/18      | Experiment 14A: Le Chatlier's Principle   |
| <b>6</b>    | Feb. 20/25      | Experiment 14B: Determination of an Equilibrium Constant  |
| <b>7</b>    | Feb. 27/March 4 | Experiment 15: The Relative Strengths of Some Acids   |
| <b>8</b>    | March 11/14     | <i>No labs – Spring Break</i>   |
| <b>9</b>    | March 18/20     | Experiment 16A: Equilibria with Weak Acids and Weak Bases   |
| <b>10</b>   | March 25/27     | Experiment 16B: An Acid-Base Titration Curve  |
| <b>11</b>   | April 1/3       | Experiment 17A: A Solubility Product Constant   |
| <b>12</b>   | April 8/10      | Experiment 17B: Qualitative Analysis of $\text{Ag}^+$ , $\text{Cu}^{2+}$ , $\text{Zn}^{2+}$ , and $\text{Ca}^{2+}$ ions |
| <b>13</b>   | April 15/17     | Experiment 18: Spontaneity  |
| <b>14</b>   | April 22/24     | Experiment 19A: Oxidation-Reduction Reactions   |
| <b>15</b>   | April 29/May1   | Check-out   |