

**CHEM 1412**  
**SYLLABUS HIGHLIGHTS**  
Full syllabus available on Blackboard  
**SUBJECT TO CHANGE: Changes will be announced as we go along**

- **PREREQUISITES:** A grade of “C” or better in CHEM 1411
- **Instructor:** Dr. Laci Alexander, Office S116, 716-2322,  
email: lalexander@southplainscollege.edu
- **Materials:**
  - **To purchase:**
    - **Textbook –Recommended**, Principles of Chemistry by Tro; 3<sup>rd</sup> Edition
    - **Lab Manual – Required, CHEM 1412**, obtained from bookstore
    - **Safety Goggles – Required**, obtained from bookstore
    - **Calculator – Required**, must be scientific, **CELL PHONES NOT ALLOWED**
    - **Scantrons – Required**, will need 4 or 5 total
  - **To print from Blackboard:**
    - **Power Point Notes – Optional** but highly recommended
    - **Chapter Homework – Required**
    - **Practice Problems – Optional** but highly recommended
    - **Pre-Lab Exercises – Required**
    - **Periodic Table – Required**
- **Four Major Exams**
  - SCANTRON is required, available at the bookstore, Apperson form 29240
  - NO MAKEUPS
  - All Multiple Choice questions
  - Each Exam is worth 100 points with the possibility of bonus points
  - Calculators will need to have their memory cleared and proof of memory clearing must be shown to the instructor before the Exam can be started
  - Cheating
    - If a student is caught cheating on any of the Major Exams they will receive a 0 for that Exam **and** be required to take the Final Exam regardless of absences or average. In the case of cheating, the Final Exam will **NOT** replace the lowest Exam score (the 0 stands and cannot be replaced)
- **Comprehensive Final Exam**
  - Possible Exemption
    - If you have 0 or 1 absence **AND** an ‘A’ or ‘B’ average, then you may opt-out of the Final Exam. If you have 2 or more absences or less than a ‘B’ average, then the Final Exam is required of you.
  - Replacement Option
    - If the final exam is taken it can replace the lowest exam score (In this option the Final Exam ends up counting twice)
  - 50 Multiple Choice questions, 100points with the possibility of bonus points
  - Scantron is required, available at the bookstore
- **Pre-Lab Exercises, Lab Worksheets, Experiments**
  - **A student will NOT be able to enter the lab without the proper attire (closed toed shoes, long pants, shirts with sleeves, long hair pulled back, and safety goggles). A student that is not dressed appropriately for lab will not be able to perform the experiment and therefore will receive a 0 for that Lab Worksheet.**
  - Pre-Lab Exercises

- Must be **TYPED on the form provided** on Blackboard and turned in **BEFORE** the Experiment can be done
    - Each Pre-Lab Exercise is worth 50 points.
  - Lab Worksheet
    - Each Lab Worksheet must be filled out during the Experiment and turned in before the student leaves the lab
    - Each lab group will turn in 1 Lab Worksheet with all group members name on it, all members will receive the same grade
    - Each Lab Worksheet is worth 50 points.
  - Experiments
    - The Pre-Lab Exercise plus the Lab Worksheet is what makes up the student's grade for that Experiment.
    - A missed Lab results in a **0** for the Lab Worksheet.
    - Make-Ups for missed Lab Experiments are **NOT** allowed.
  - Lowest Lab Grade Dropped
    - At the end of the semester the Instructor will automatically drop the lowest Lab Grade for each student.
- **Chapter Homework**
  - Each chapter will have a chapter worksheet available on blackboard. These will be turned in one to two class days after the chapter material has been finished. The date will be announced on the syllabus.
  - Lowest Homework Grade Dropped
    - At the end of the semester the Instructor will automatically drop the lowest homework grade for each student.
- **Cell Phone and Laptop Computer Policy**
  - Cell Phones and Laptops may be taken up and kept during lecture and lab if they are a distraction to the student, the instructor or the class
  - The only exception will be due to Special Services recommendations and those will be handled on an individual student to student basis
- **Attendance**
  - 4 absences max and I drop you with an 'F'
  - Last Day to Drop is \_\_\_\_\_
- **Grading:**
  - Exams are 70%
  - Lab Reports count 30%
- **Diversity Statement:** In this class, the teacher will establish and support an environment that values and nurtures individual and group differences and encourages engagement and interaction. Understanding and respecting multiple experiences and perspectives will serve to challenge and stimulate all of us to learn about others, about the larger world and about ourselves. By promoting diversity and intellectual exchange, we will not only mirror society as it is, but also model society as it should and can be.
- **Disability Statement:** Students with disabilities, including but not limited to physical, psychiatric, or learning disabilities, who wish to request accommodations in this class should notify the Disability Services Office early in the semester so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodations must provide acceptable documentation of his/her disability to the Disability Services Office. For more information, call or visit the Disability Services Office at Levelland (Student Health & Wellness Office) 806-716-2577, Reese Center (Building 8) 806-716-4675, or Plainview Center (Main Office) 806-716-4302 or 806-296-9611.

- **Note to students with disabilities:** If you have a disability-related need for reasonable academic adjustments in this course, you must provide the instructor with a letter of accommodation from the Disability Services Office. If you need immediate accommodations or physical access, please arrange to meet with the Disability Services Office before the next class meeting.

CHEMISTRY 1412 (4:3:3)

GENERAL CHEMISTRY II

INSTRUCTIONAL AREA: CHEMISTRY

DEPARTMENT: SCIENCE

DIVISION: ARTS AND SCIENCES

SOUTH PLAINS COLLEGE

SPRING 2018

INSTRUCTOR: L. ALEXANDER

## Course Description

CHEM 1412: (4:3:3) Chemical equilibrium; phase diagrams and spectrometry; acid-base concepts; thermodynamics; kinetics; electrochemistry; nuclear chemistry; an introduction to organic chemistry and descriptive inorganic chemistry. Basic laboratory experiments supporting theoretical principles presented in lecture; introduction of the scientific method, experimental design, chemical instrumentation, data collection and analysis, and preparation of laboratory reports. Semester Hours: 4 Lecture Hours: 3 Lab Hours: 3 Pre-requisite: A grade of "C" or better in CHEM 1411.

## Instructor:

Dr. Laci Alexander

Office: S116, Science building

Phone: 716-2322

Email: [lalexander@southplainscollege.edu](mailto:lalexander@southplainscollege.edu)

Office Hours: MW: 8:30 – 9:30 AM

TR: 8:30 – 9:30 AM; 1:30 – 2:30 PM

F: 9:00 AM – 12:00 PM

Office hours can also be made by appointment.

## Tutor:

Room S121

## Textbook:

### **RECOMMENDED**

Available at the Bookstore

Principles of Chemistry, A Molecular Approach, 3<sup>rd</sup> Edition by Tro

## Lab Manual:

### **REQUIRED**

Available at the Bookstore

CHEM 1412

## Safety Goggles:

### **REQUIRED**

Available at the Bookstore

## Calculator:

### **REQUIRED**

You will need a scientific calculator for this course. An inexpensive model will be just fine. You are responsible for learning how to use your calculator. Cell phones **CAN NOT** be used for calculators. Calculators'

memory **WILL** be cleared before an Exam can be taken! It is the student's responsibility to know how to clear the calculator's memory.

Scantrons:

**4 or 5 REQUIRED**

Available at the Bookstore

Apperson form 29240

Power Point Notes:

**OPTIONAL, BUT HIGHLY RECOMMENDED**

To be printed off Blackboard

Pre-Lab Exercises:

**REQUIRED**

To be obtained from Blackboard

These Pre-Lab Exercises must be TYPED on the form provided on Blackboard and turned in BEFORE the Experiment can be performed. A Pre-Lab that is not typed will not be accepted. Each Pre-Lab Exercise is worth 50 points.

Lab Worksheets:

**REQUIRED**

Provided by Instructor at Lab

These worksheets will be completed in groups during the lab time and turned in before the student leaves. Every member of the group will put their name on the worksheet and all members will receive the same grade.

Labs/Experiments:

You will perform a series of experiments and exercises in the lab, which are designed to reinforce the classroom material and give you hands-on experience of a chemical nature. A missed lab CANNOT be made up. Pre-Lab Exercises must be completed and turned in before the experiment is conducted. If a student is absent the day of the Experiment that student will receive a 0 for the Lab Worksheet. The student is still responsible for collecting any material that was given during the Experiment in order to be prepared for questions on the Exam that come from the Experiments. At the end of the semester the Instructor will automatically drop the lowest lab grade for the student. **A student will NOT be able to enter the lab without the proper attire (closed toed shoes, long pants, shirts with sleeves, long hair pulled back, and safety goggles). A student that is not dressed appropriately for lab**

**will not be able to perform the experiment and therefore will receive a 0 for that Lab Worksheet.**

Periodic Table:

**REQUIRED**

One is available for print from Blackboard or you may purchase one if you wish.

Cell Phones/Laptop Computers:

Cell phones and Laptop Computers **CAN NOT** be used in Lecture or Lab. Cell phones **CAN NOT** be used for calculators. If you are caught using your cell phone during class or if the phone continuously rings during class the cell phone will be confiscated. Cell phones and Laptops **MUST NOT** be out on the desk or in your hands during class or lab, otherwise they may be taken up. If a cell phone or Laptop is confiscated it will be kept during Lecture and Lab. The only exception to this will be in the case of a Special Services recommendation, which will be handled on an individual student basis.

Chapter Homework

Each chapter will have a worksheet available on blackboard. These will be turned in one to two class days after the chapter material has been finished. The date will be announced on the syllabus.

The lowest homework grade will drop at the end of the semester.

Major Exams:

There will be four major exams. Each exam is worth 100 points, with possibility of bonus points. Questions will be based on the material covered in class and lab. A missed exam will receive a score of zero. There will be **NO** make-ups. Each Major Exam will contain a portion of new material and a portion of comprehensive material. Reminder: Practice Problems can be turned in at the time of the major exam for 5 bonus points. Scantrons will be needed for the Exams. Calculators will have to have their memory cleared and proof shown to the instructor before the student can start the Exam. The student is responsible for knowing how to clear their calculator's memory.

Final Exam:

The final exam is comprehensive and is worth 100 points. The final must be taken on the scheduled day. **NO** make up is available for the final since

it is scheduled at the very end of the term. Extenuating circumstances will be handled on a case-by-case basis.

Possible Exemption – If you have 0 or 1 absence **AND** an 'A' or 'B' average, then you may opt-out of the Final Exam. If you have 2 or more absences or less than a 'B' average, then the Final Exam is required of you.

Replacement Option – The Final Exam can be taken to replace the lowest exam score. In this option, the final ends up counting twice, by replacing one exam and counting as the final exam itself.

Cheating – If a student is caught cheating on any of the Major Exams they will receive a 0 for that Exam **AND** be required to take the Final Exam regardless of absences or average. In the case of cheating, the Final Exam will NOT replace the lowest Exam score (the 0 stands and cannot be replaced).

#### Notecards:

A 3X5 notecard will be permitted for Exams 3-5 and a 4X6 notecard may be used for the final exam. Both sides of the notecard may be used and maybe handwritten or typed. Notecards should contain formulas, definitions, and constants, or any other information allowed by the instructor announced in class. Notecards CAN NOT contain any worked examples from class notes, in-class worksheets, practice problems, or any other examples found online. A student should also not write any questions on the notecard.

For each unauthorized example found on the notecard points will be deducted from the exam. The length of the exam and the amount of unpermitted information will determine the number of points deducted. Any bonus points for that exam will also be deducted from the exam total. Any unauthorized material on the notecard is classified as cheating therefore the cheating policies in the syllabus will also be followed.

#### Lectures:

Classroom and laboratory lectures are intended to help you to better understand the subject matter. Lecture topics (classroom and lab) will serve as the basis for exam questions.

#### Attendance:

Class attendance is very important. Make every effort to be present. If you must miss a class or must leave early, please let me know about it **BEFORE** class begins or an unexcused absence will be given. You must



attend the **FULL** time of class in order to be considered present. You will be counted absent if you leave during the scheduled class time.

If you are unable to complete this course, you must initiate a withdrawal (W) through the Registrar's Office before **April 28**. If you simply stop attending class without withdrawing, I will administratively drop you for excessive absences, and you will receive a grade of "**F**" at the end of the term, in accordance with policies set forth in the 2015-2016 SPC General Catalog.

You are a candidate for an excess absence drop (**F**) if you miss 4 class days **total**, without clearing your absences with me. Two excused absences equal one unexcused absence and will count towards the 4 excess absences.

#### Grading Policy:

Exams	70%
Labs	30%

Grades will be assigned on the following basis:

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
< 60	F

#### Diversity Statement:

In this class, the teacher will establish and support an environment that values and nurtures individual and group differences and encourages engagement and interaction. Understanding and respecting multiple experiences and perspectives will serve to challenge and stimulate all of us to learn about others, about the larger world and about ourselves. By promoting diversity and intellectual exchange, we will not only mirror society as it is, but also model society as it should and can be.

#### Disability Statement:

Students with disabilities, including but not limited to physical, psychiatric, or learning disabilities, who wish to request accommodations in this class should notify the Disability Services Office early in the semester so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodations must provide acceptable

documentation of his/her disability to the Disability Services Office. For more information, call or visit the Disability Services Office through the Guidance and Counseling Centers at Reese Center (Building 8) 806-716-4606, or Levelland (Student Services Building) 806-716-2577.

**Note to students with disabilities:**

If you have a disability-related need for reasonable academic adjustments in this course, you must provide the instructor with a letter of accommodation from the Disability Services Office. If you need immediate accommodations or physical access, please arrange to meet with the Disability Services Office before the next class meeting.

## **From the General Chemistry II Common Course Syllabus**

### **Core Objectives Addressed:**

- **Communication skills** - to include effective written, oral, and visual communication
- **Critical Thinking skills** - to include creative thinking, innovation, inquiry and analysis, evaluation and synthesis of information
- **Empirical and Quantitative skills** - to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
- **Teamwork skills** - to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

**Course Purpose:** The purpose of the natural science component in the core curriculum is to enable the student to understand and apply relationships and theories of the natural sciences. Mastering general chemistry will enable the student to use the fundamentals to analyze, classify, and predict events based on chemical and physical properties.

### **Course Requirements:**

1. The student should do each of the following:
  - a. Read the assigned chapters in the textbook and laboratory manual.
  - b. Attend all lectures and laboratory classes.
  - c. Take notes in class.
  - d. Participate in class discussions.
  - e. Complete assigned outside reading material and homework.
  - f. View audiovisual materials on selected topics.
  - g. Use the computer software in the lab and/ or classroom as it is assigned.
  - h. Complete the exams on the assigned dates; the exams may include essay questions.
2. For laboratory the student should:
  - a. Complete the prelab assignment before going into lab.
  - b. Read and Comprehend each experiment assigned in the laboratory manual.
  - c. Successfully complete each experiment.
  - d. Learn to use and/or analyze data from instruments or equipment needed to complete the experiments. (e.g. balance, pH meters, volumetric glassware)
  - e. Complete the laboratory reports, including post lab calculations and discussion questions.

**Student Learning Outcomes:** Upon completion of the course, the student will show competence in the course objectives listed below:

#### **From Lecture:**

1. Physical Properties of Solutions
  - a. Understand the definition of a solution and how a solution forms from a molecular point of view; to learn the different types of solutions
  - b. Learn the various methods of calculating the concentration of a solution and the corresponding units that go along with each method
  - c. Learn how temperature affects the solubilities of substances and how pressure affects the solubility of gases in solution

- d. Understand the colligative properties of solutions and how to calculate changes in the freezing point and boiling point of a solution
2. Chemical Kinetics
  - a. Learn what the rate of a reaction means, how to determine it, and how to write the rate law for reactions
  - b. Understand the relation between reactant concentration and time, and how to calculate concentrations and times
  - c. Study the definition of activation energy and understand how rate constants are dependent on temperature
  - d. Discover how to determine a likely reaction mechanism
3. Chemical Equilibrium
  - a. Discover what chemical equilibrium is and study how to write an equilibrium expression using the law of mass action
  - b. Study about homogeneous and heterogeneous equilibria and how these affect the equilibrium expression
  - c. Discover the difference between the equilibrium constant and the reaction quotient and how these are used to predict the direction a reaction will proceed to reach equilibrium
  - d. Calculate the equilibrium constant using given equilibrium concentrations and calculate equilibrium concentrations given the equilibrium constant
  - e. Learn what factors affect equilibrium
4. Acids and Bases
  - a. Discover the Bronsted-Lowry and Arrhenius definitions of acids and bases as well as how to determine which compound is the acid or base
  - b. Learn the acid-base properties of water and how the ion-product constant of water is determined and used
  - c. Study pH and how it is calculated
  - d. Distinguish between strong acids/bases and weak acids/bases and learn how to calculate the pH of these acids and bases using ionization constants when necessary
  - e. Understand the acid-base properties of salts and how to calculate the pH of a salt solution
5. Acid-Base Equilibria and Solubility Equilibria
  - a. Learn about the common ion effect and how the Henderson-Hasselbalch equation can be used to calculate the pH of solutions that have a common ion
  - b. Discover buffers including their definition, calculation of their pH, and the preparation of one
  - c. Study about acid-base titrations and the calculation of pH at different points during a titration as well as learning about indicators that can be used during a titration
  - d. Understand solubility equilibria and distinguish between solubility and molar solubility
  - e. Perform calculations involving the solubility product constant and study how the common ion effect affects solubility
6. Thermodynamics
  - a. Discover what a spontaneous process is
  - b. Learn about entropy including the second and third law of thermodynamics and to perform entropy calculations
  - c. Understand the meaning of Gibbs Free Energy, perform Gibbs Free Energy calculations and to learn how the free energy change affects spontaneity
  - d. Discover how free energy and chemical equilibrium are related

7. Electrochemistry
  - a. Learn about redox reactions and how to balance them using the half-reaction method
  - b. Learn about voltaic cells and how to write cell diagrams
  - c. Study about standard reduction potentials including their use in calculating cell voltages
  - d. Explore the spontaneity of redox reactions and how standard cell voltages, equilibrium constants, and standard free energy changes are related
  - e. Understand what affect concentration has on cell voltage and perform related calculations
  - f. Study about corrosion
8. Nuclear Chemistry
  - a. Distinguish between nuclear and chemical reactions
  - b. Study the types of particles involved in nuclear reactions as well as how to use them to balance nuclear reactions
  - c. Study about nuclear stability and how this affects radioactive decay
  - d. Learn about natural radioactivity and the kinetics of these processes
  - e. Distinguish between nuclear transmutation, nuclear fission, and nuclear fusion

**From Lab:**

1. Safety Orientation
  - a. Demonstrate the fundamentals of laboratory safety including the use and location of safety equipment
2. Calculations involving solutions
  - a. Demonstrate knowledge of calculations involving solutions
3. Freezing point depression
  - a. Perform or view a demonstration of a freezing point depression experiment including calculations of molar mass with data collected
4. Molar mass by the boiling point method
  - a. Perform or view a demonstration of an experiment that uses boiling point elevation data to determine molar mass
5. Kinetics
  - a. Perform or view a demonstration of an experiment that employs the use of spectrometer data to determine the order of a reaction
6. Acids and Bases
  - a. Demonstrate knowledge of acids and bases by calculation of their pH's
7. Weak acid ionization constant
  - a. Perform or view a demonstration of an experiment that uses titration data collected from pH meters to calculate the ionization constant of a weak acid
8. Common ion effect
  - a. Perform or view a demonstration of an experiment that uses titration data to prove the common ion effect

## EXAM OVERVIEW

### Exam 1

#### Lab Safety

#### Chapter 12: Solutions

*Learning Objective Met: Lecture #1,#2, #13*

#### Chapter 13: Chemical Kinetics

*Learning Objective Met: Lecture #2, #3, #5, #7, #9*

#### Worksheet 1: Calculations Involving Solutions

*Learning Objectives Met: Lecture #1, #13, all Lab LOs*

#### Experiment 1: Determination of Molar Mass Using Boiling Point Elevation

*Learning Objectives Met: Lecture #1, #13, all Lab Los*

#### Worksheet 2: Kinetics of a Bromine/Formic Acid Reaction

*Learning Objectives Met:*

### Exam 2

#### Chapter 14: Chemical Equilibrium

*Learning Objective Met: Lecture #6, #7, #8, #10*

#### Chapter 15: Acids and Bases

*Learning Objective Met: Lecture #7, #8, #10, #12*

#### Experiment 2: Determining the Concentration of a Solution: Beer's Law

*Learning Objectives Met: Lecture #2, #7, #12, all Lab LOs*

#### Experiment 3: Timed-Release Vitamin C Tablets

*Learning Objectives Met: Lecture #7, #8, #12, all Lab LOs*

#### Worksheet 3: Acids and Bases

*Learning Objectives Met: Lecture ##10, #12, all Lab LOs*

### Exam 3

#### Chapter 16: Aqueous Ionic Equilibrium

*Learning Objective Met: Lecture #11*

#### Chapter 17: Free Energy and Thermodynamics

*Learning Objective Met: Lecture #10, #12*

#### Experiment 4: Acid-Base Titration

*Learning Objectives Met: Lecture #11, all Lab LOs*

#### Experiment 5: Determining $K_a$ by the Half-Titration of a Weak Acid

*Learning Objectives Met: Lecture #12, all Lab Los*

#### Experiment 6: Buffers

*Learning Objectives Met:*

#### Experiment 7: The Buffer in Lemonade

*Learning Objectives Met:*

### Exam 4

#### Chapter 18: Electrochemistry

*Learning Objective Met: Lecture #3, #5*

#### Chapter 19: Radioactivity and Nuclear Chemistry

*Learning Objective Met: Lecture #4*

#### Experiment 8: $K_{sp}$ Determination of Sodium Chloride

*Learning Objective Met: Lecture #3, all Lab Los*

#### Experiment 9: Heat of Fusion for Ice

*Learning Objectives Met:*

### Final Exam – Comprehensive

## COURSE SYLLABUS

We will follow this schedule as closely as possible; any changes will be announced as we go along.

Week	Day	Lecture	Lab	Homework Due
1	Tuesday January 16	Introduction	Lab Safety	
	Thursday January 18	<b>No Class</b>		
2	23-Jan	Chapter 12	No Lab	
	25-Jan	Chapter 12	No Lab	
3	30-Jan	Chapter 12	Ch 12 HW IN CLASS	
	1-Feb	Chapter 13	Lab Worksheet 1	Chapter 12 HW
4	6-Feb	Chapter 13	Experiment 1	
	8-Feb	Chapter 13	Ch 13 HW IN CLASS	
5	13-Feb	<b>Exam 1</b>		Chapter 13 HW
	15-Feb	Chapter 14	Lab Worksheet 2	
6	20-Feb	Chapter 14	Ch 14 HW IN CLASS	
	22-Feb	Chapter 15	Experiment 2	Chapter 14 HW
7	27-Feb	Chapter 15	Experiment 3	
	1-Mar	Ch 15 HW IN CLASS	Worksheet 3	
8	6-Mar	<b>Exam 2</b>		Chapter 15 HW
	8-Mar	Chapter 16	Chapter 16	

★	13-Mar	<b>NO SCHOOL</b>		
	15-Mar	<b>SPRING BREAK</b>		
9	20-Mar	Chapter 16	Experiment 4	
	22-Mar	Chapter 16	Experiment 5	
10	27-Mar	Chapter 17	Ch. 16 HW IN CLASS	
	29-Mar	Chapter 17	Experiment 6	Chapter 16 HW
11	3-Apr	<b>NO SCHOOL</b>		
	5-Apr	Ch. 17 HW IN CLASS		
12	10-Apr	<b>Exam 3</b>		Chapter 17 HW
	12-Apr	Chapter 18	Chapter 18	
13	17-Apr	Ch 18 HW IN CLASS	Experiment 7	
	19-Apr	Chapter 19	Chapter 19	Chapter 18 HW
14	24-Apr	Ch 19 HW IN CLASS	Experiment 8	
	26-Apr	Chapter 20		Chapter 19 HW
15	1-May	<b>Exam 4</b>		
	3-May	<b>FINAL EXAM REVIEW</b>		
	<b>Tuesday</b> <b>9-May</b>	<b>FINAL EXAM</b> Section 004: 10:15 am - 12:15 pm		<b>** This final will be given during the scheduled lab time</b>