

CHEM 1312/1112

General Chemistry

Summer II, 2020



Instructor:

Dr. Gregory Smith

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Office: CAV 207A

Office Hours: MTWRF 1 pm to 2 pm.

CHEM 1312 — GENERAL CHEMISTRY LECTURE CLASS

Lecture Class Meeting Times

Sec	Days	Time	Instructor	Location
010	MTWRF	11:00 am-12:45 pm	Dr. Smith	CAV 223

Required Texts and Materials

- **Textbook and ALEKS online homework:**

Paul Flowers, Klaus Theopold, Richard Langley, and William R. Robinson,
Chemistry 2e (2nd edition). <https://openstax.org/details/books/chemistry-2e>

Purchasing Options:

1. Textbook – FREE!
 2. ALEKS – McGraw-Hill; <https://www.aleks.com>
- **Calculator [Required]:** Scientific calculator capable of performing calculations with scientific notation and logarithms. *Bring your calculator to class and to lab every day. Only non-programmable calculators may be used on the exams.*
 - Access to **Slack**. Along with email, we will be using Slack to communicate.

Course Description

CHEM 1312 General Chemistry II (3-0). This course, which is a continuation of Chemistry 1311, focuses on chemical kinetics, chemical equilibrium, acid-base chemistry, and thermodynamics. Additional topics, such as environmental chemistry,

electrochemistry, coordination chemistry, nuclear chemistry, organic chemistry, and/or polymers, may also be introduced.

Prerequisites: Chemistry 1311/1111 or 1411, must be completed with a “C” or better in order to enroll in Chemistry 1312/1112. **Corequisite:** Chemistry 1112.

CHEM 1112 General Chemistry II Laboratory (0-3). Laboratory experiments that focus on laboratory technique, data collection, and analysis. The experiments will expand upon the concepts and topics presented in Chemistry 1312.

Corequisite: Chemistry 1312.

Technology Requirements

We will utilize some online systems in the course. Students are required to have access to:

- A computer with internet access to connect to **Blackboard**.
- Access to **ALEKS**.
- **Respondus LockDown Browser** installed for exams.
- Access to **Slack**. Join our Slack workspace using this link: https://join.slack.com/t/chem13121112w-smc9425/shared_invite/zt-sqsug29h-hg~HGfTaDkd_ltdzQZ55Q. Slack is an easy way to get in touch with me or other students to discuss homework and form study groups.

Grading

Evaluation and Grades

Course grades will be determined as indicated in the table below.

Assessment	Total Points
Exams (3×100 pts)	300 pts
Final Exam	150 pts
Quizzes, classroom participation	150 pts
ALEKS Homework	200 pts
Laboratory Points	200 pts
Total	1000 pts

Students who are taking both CHEM 1112 and CHEM 1312 for the first time who wish to drop either course **must** drop both courses, because dropping either course would result in the co-requisite requirement no longer being met.

Overall grades in CHEM 1312/1112 will be determined as follows:

- If **BOTH** CHEM 1312 and CHEM 1112 are completed, the letter graded will be based on a total of 1000 points.

- For students who begin and complete **ONLY** CHEM 1312, a percentage will be calculated using only lecture assessments (first four items listed above with 800 points possible) and the letter grade will be assigned based on that percentage.
- For students who begin and complete **ONLY** CHEM 1112, the percentage will be calculated using only lab assessments and that percentage will be used to assign a letter grade.”

Grading System

Course grades will be dependent upon completing course requirements and meeting the student learning outcomes.

The following grading scale will be used for this course:

- A = 900-1000 points (90-100%)
- B = 800-899 points (80-89.9%)
- C = 700-799 points (70-79.9%)
- D = 600-699 points (60-69.9%)
- F = 0-599 points (<60%)

Exams

The exams will be given during regular class time on the dates listed below:

Exam	Date	Room	Time
Exam 1	Wednesday, July 21	CAV 223	11:00 am
Exam 2	Monday, August 2	CAV 223	11:00 am
Exam 3	Tuesday, August 10	CAV 223	11:00 am

These exams will be taken using a device such as a laptop or tablet and the **Respondus LockDown Browser**.

Most of the exams will be over material covered since the last exam. However, the course builds on material delivered earlier so the concepts, calculations and techniques from earlier exams may be required. **Only non-programmable calculators may be used on the exams (i.e., no graphic calculators are allowed).**

Make-up exams will be at the discretion of your individual faculty. Usually, allowances will only be made in the case of an excused university absence. Communication with your instructor is critical.

Final Exam

The Final Exam will be a comprehensive multiple-choice standardized exam published by the American Chemical Society (ACS). Study guides for the ACS exam (“General Chemistry - Official Study Guide”) are available from the [ACS web page](#).¹ The schedule for the 1312 final exam is shown below. The complete final exam schedule is also available on the [ASU web page](#).²

Sec	Days	Lecture Time	Instructor	Final Exam Date	Time
010	MRWRF	11:00 am - 12:45 pm	Dr. Smith	Friday, August 13	10:15 am-12:15 pm

Blackboard

Grades will be posted on [Blackboard](#) as well as information, handouts, homework assignments, and other course documents.

Attendance

You are expected to attend all class meetings. You are expected to arrive on time and to stay until the end of the lecture. In-classroom activities such as worksheets and quizzes cannot be made up. You will not be automatically dropped if you stop attending class.

Last Day to Drop

The last day to drop the course with a grade of “W” is **August 2, 2021**.

CHEM 1112 — GENERAL CHEMISTRY LABORATORY

Laboratory Meeting Times

The lab class that accompanies the CHEM 1312 lecture course is shown below. We will meet in the Class Room listed for a pre-lab lecture, then move in to the Lab Room to perform the lab. We will be doing two or three labs a week, and they will be due 2 days after we run them.

Section	Day	Time	Instructor	Class Room	Lab Room
02Z	TWR	2:00-4:50 pm	Dr. Smith	CAV 223	CAV 216

The CHEM 1112 General Chemistry laboratory class accompanies this lecture class. The lab is designed to illustrate some of the principles involved in performing scientific measurements, handling chemicals, and performing chemistry experiments. In some cases, the experiments in the lab will introduce you to concepts before you cover them

in the lecture course, and in some cases, the experiments will reinforce concepts already covered in the lecture course.

Required Materials

- **Calculator [Required]:** Scientific calculator capable of performing calculations with scientific notation and logarithms. *Bring your calculator to class and to lab every day. Only non-programmable calculators may be used on the exams.*
 - Access to **Slack**. Join our Slack workspace using this link: https://join.slack.com/t/chem13121112w-smc9425/shared_invite/zt-sqsug29h-hg~HGfTaDkd_ltdzQZ55Q. Slack is an easy way to get in touch with me or other students to discuss homework and form study groups.
- **Approved Lab Goggles [Required]** (available from the ASU Bookstore)

Lab Procedures and Lab Reports

I will be going over the procedure for each lab or worksheet in the prelab lecture. You must attend the lab lectures before the lab work. Some labs and the worksheets will be turned in through Blackboard. Each lab will be worth 100 points. There will be one optional bonus lab during the last week, which can replace your lowest lab score. The point average in Lab will be scaled to 200 points and then incorporated into your overall CHEM 1312/1112 grade if applicable.

Lab Exams

There will be one 100-point lab mid-term and a 100-point lab final including a practical portion.

This syllabus is subject to change.

LECTURE AND LAB SCHEDULE — Summer II, 2020

Day	Date	Lecture	Lab
1	July 12	Chapter 10 Liquids and Solids	-
2	July 13	Chapter 10 continued	Math Review and Worksheet
3	July 14	Chapter 11 Solutions and Colloids	Qualitative Analysis
4	July 15	Chapter 12 Kinetics	Qualitative Analysis continued
5	July 16	Chapter 12 continued	-
6	July 19	Chapter 12 continued	-
7	July 20	Chapter 13 Fundamental Equilibrium Concepts	Spectrophotometry of FD&C Red #40
8	July 21	Exam 1 (Chapters 10, 11, 12)	Kinetics of Crystal Violet
9	July 22	Chapter 13 continued	Kinetics of Crystal Violet and Temperature
10	July 23	Chapter 13 continued	-
11	July 26	Chapter 14 Acid-Base Equilibria	-
12	July 27	Chapter 14 continued	Midterm
13	July 28	Chapter 15 Equilibria of Other Reaction Classes	Equilibrium and Le Châtelier's Principle
14	July 29	Chapter 15 continued	Analysis of Antacid Tablets
15	July 30	Chapter 16 Thermodynamics	-
16	Aug. 2	Exam 2 (Chapters 13, 14, 15)	-
17	Aug. 3	Chapter 16 continued	Analysis of Titration Curves
18	Aug. 4	Chapter 16 continued	Gibbs Free Energy, Entropy, and Spontaneous Reactions
19	Aug. 5	Chapter 17 Electrochemistry	Electrochemistry
20	Aug. 6	Chapter 17 continued	-
21	Aug. 9	Chapter 17 continued	-
22	Aug. 10	Exam 3 (Chapters 16, 17)	Bonus Lab
23	Aug. 11	Chapter 21 Nuclear Chemistry	Lab Final (practical)
24	Aug. 12	Chapter 21 continued	Lab Final (written)
25	Aug. 13	Final Exam	-

General Policies Related to This Course

All students are required to follow the policies and procedures presented in these documents:

- [Angelo State University Student Handbook](#)³
- [Angelo State University Catalog](#)⁴

Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

The College of Science and Engineering adheres to the university's [Statement of Academic Integrity](#).⁵

Accommodations for Students with Disabilities

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student's responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ADA@angelo.edu. For more information about the application process and requirements, visit the [Student Disability Services website](#).⁶ The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dallas Swafford
Director of Student Disability Services
Office of Student Affairs
325-942-2047
dallas.swafford@angelo.edu
Houston Harte University Center, Room 112

Incomplete Grade Policy

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 [Grading Procedures](#)⁷ for more information.

Plagiarism

Plagiarism is a serious topic covered in ASU's [Academic Integrity policy](#)⁸ in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will

summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality. Resources to help you understand this policy better are available at the [ASU Writing Center](#).⁹

Student Absence for Observance of Religious Holy Days

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for [Observance of Religious Holy Day](#)¹⁰ for more information.

Title IX at Angelo State University

The University prohibits discrimination based on sex, which includes pregnancy, sexual orientation, gender identity, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination including: sexual assault, sex-based discrimination, sexual exploitation, sexual harassment, public indecency, interpersonal violence (domestic violence and/or dating violence), and stalking. As a faculty member, I am a Responsible Employee meaning that I am obligated by law and ASU policy to report any allegations I am notified of to the Office of Title IX Compliance.

Students are encouraged to report any incidents of sexual misconduct directly to ASU's Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:

Michelle Boone, J.D.
Director of Title IX Compliance/Title IX Coordinator
Mayer Administration Building, Room 210
325-942-2022
michelle.boone@angelo.edu

You may also file a report online 24/7 at www.angelo.edu/incident-form.

If you are wishing to speak to someone about an incident in confidence you may contact the University Health Clinic and Counseling Center at 325-942-2173 or the ASU Crisis Helpline at 325-486-6345.

For more information about Title IX in general you may visit www.angelo.edu/title-ix.

Student Learning Outcomes

- **Learning Goal 1:** Students will be able to analyze complex chemical problems and draw logical conclusions.
 - Students will be able to identify intermolecular interactions in a solid, liquid or solution and analyze the strength and nature of those interactions.
 - Students should be able to write equilibrium expression for any chemical reaction and determine the value of equilibrium constants from experimental data.
 - Students should be able to use equilibrium constants and expressions to
 - describe the tendency of the reaction to favor reactants or products
 - predict the direction of the reaction given the equilibrium constant and the starting concentrations of all reactants and products
 - determine the equilibrium concentrations given sufficient information about either the equilibrium or starting concentrations of the reactants and products
 - Students should be able to use Le Chatelier's Principle to determine how a system at equilibrium will change with changes in reaction conditions such as concentration, pressure or temperature.
 - Students should be able to describe electrochemical cells using cell notations or a sketch and determine the standard state cell potential.
 - Students should be able to use the relationship between cell potential, free energy and equilibrium constants.
- **Learning Goal 2a:** Students will be able to understand and apply scientific reasoning in the chemical sciences.
 - Students should be able to classify solids by type of bonding (molecular, ionic, metallic or network covalent) and extent of organization (crystalline, microcrystalline and amorphous) and describe and explain the properties of different solids based on that classification.
 - Students will be able to define the phases of matter using the following frameworks:
 - Compressibility and fluidity
 - Kinetic molecular theory (movement of molecules within a sample)
 - Kinetic molecular theory (kinetic energy vs. intermolecular interactions)
 - Students should be able to describe phase transitions in terms of enthalpies, heating curves and phase diagrams.
 - The student should be able to state the first three laws of thermodynamics and explain how they affect real world systems.
 - Students should have a knowledge of common forms of nuclear radiation and processes.
 - Student should be able to use oxidation numbers to identify and balance redox reactions.
- **Learning Goal 2b:** Students will be able to employ mathematics in the analysis of chemical problems.
 - Students should be able to describe solution concentrations in a variety of ways

- and use concentration to predict properties of solutions.
- Students should be able to do calculations involving solution concentrations including those involving colligative properties.
 - Students should be able to use experimental data to obtain reaction rate laws and use reaction rate laws to predict the rates of reactions.
 - Students should understand how free energy, enthalpy and entropy are related and how free energy is dependent on temperature.
 - Students should be able to determine the entropy and enthalpy changes of a reaction from free energy values or equilibrium constants measured at different temperatures.
 - Students should be able to use an understanding of the relationship between free energy, enthalpy and entropy to explain the dependence of free energy on temperature.
- **Learning Goal 3:** Students will be able to demonstrate technical and analytical skills in chemistry.
 - Students will be able to analyze rates of chemical reactions and be able to relate reaction rates to the molecular mechanisms of those reactions.
 - Students should be able to determine the entropy and enthalpy changes of a reaction from free energy values or equilibrium constants measured at different temperatures.
 - Students should be able to use reaction rate versus temperature data to determine the activation energy of a chemical reaction.
 - The student should be able to predict the products of α -particle and β -particle emission.
 - The student should know how to determine cell potentials at non-standard state concentrations and partial pressures of reactants and products or be able to use potentials measured under these conditions to determine the concentration of a reactant or product.

Evaluation of Student Learning Outcomes

Student learning outcomes will be evaluated by test questions or by the grading of in-classroom activities, as described by your instructor.

Texas Higher Education Coordinating Board Natural Sciences Objectives

The objective of the study of a natural sciences component of a core curriculum is to enable the student to understand, construct, and evaluate relationships in the natural sciences, and to enable the student to understand the basis for building and testing theories.

Exemplary Educational Objectives

1. To understand and apply method and appropriate technology to the study of natural sciences.

2. To recognize scientific and quantitative methods and the differences between these approaches and other methods of inquiry and to communicate findings, analyses, and interpretation both orally and in writing.
3. To identify and recognize the differences among competing scientific theories.
4. To demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies.
5. To demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture.

¹ <http://uwm.edu/acs-exams/students/student-study-materials/>

² http://www.angelo.edu/services/registrar_office/final.html

³ <https://www.angelo.edu/student-handbook/>

⁴ <https://www.angelo.edu/catalogs/>

⁵ <https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>

⁶ <https://www.angelo.edu/services/disability-services/>

⁷ <https://www.angelo.edu/content/files/14197-op-1011-grading-procedures>

⁸ <https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>

⁹ https://www.angelo.edu/dept/writing_center/academic_honesty.php

¹⁰ <https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of>