

CHEM 1312/1112

General Chemistry

Spring, 2022



Instructors:

Dr. Kyle Beran (Lecture)

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Phone: 486-6663

Office: CAV 102B

Office Hours: MWF 2-3pm, TR 11-noon, or by appointment

Dr. Gregory Smith (Lecture and Lab)

Email: Gregory.Smith@angelo.edu

Phone: 486-6628

Office: CAV 207A

Office Hours: Check with faculty member

Dr. Edith Osborne (Lab)

Email: Edith.Osborne@angelo.edu

Phone: 486-6629

Office: CAV 218

Office Hours: T 10-noon and 1-2pm, WF 11-noon, or by appointment

Mr. Rigel Rilling (Lab)

Email: Rigel.Rilling@angelo.edu

Phone: 486-6654

Office: CAV 201B

Office Hours: W 1:30-5:00 pm, R 11:30 am-2:00 pm.

CHEM 1312 — GENERAL CHEMISTRY LECTURE CLASS

Class Meeting Times

Sec	Days	Time	Instructor	Location
010	MWF	09:00 am – 09:50 am	Dr. Beran	CAV 211
020	TR	09:30 am – 10:45 am	Dr. Smith	CAV 223
030	MWF	10:00 am – 10:50 am	Dr. Beran	CAV 200

Required Texts and Materials

- **Textbook, ALEKS online homework, and LabFlow**
Paul Flowers, Klaus Theopold, Richard Langley, and William R. Robinson, *Chemistry 2e* (2nd edition). You can access the book by clicking on the following link: [OpenStax Chemistry Textbook by Paul Flowers](#)
Purchasing Options:
 1. Textbook – FREE!
 2. ALEKS – McGraw-Hill; \$70 for one semester, \$75 for 1 year, [ALEKS HW](#)
 3. LabFlow – Catalyst Education; \$49.99 per semester, [LabFlow Create Account](#)
- **Approved Lab Goggles [Required]** (available from the ASU Bookstore or from the lab stockroom)
- **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.*

Course Description

1312/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 electrochemistry, environmental chemistry, coordination chemistry, nuclear chemistry, organic chemistry, and polymers, may also be introduced. **Prerequisites:** Chemistry 1311/1111 or 1411, much be completed with a “C” or better in order to enroll in Chemistry 1312/1112. **Corequisite:** Chemistry 1112.

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. **Co-requisite:** Chemistry 1312.

Technology Requirements

To successfully complete this course, students need to obtain access to **ALEKS**, an online homework program. These assignments will be averaged to give a 200-point grade. To register with ALEKS, follow the instructions in the “ALEKS Student Registration” document. The ten-digit class code that you need for registering with ALEKS:

1311.010 – VFA6M-WV3LJ
1311.030 – UGLAV-JFXKL

You also need access to [LabFlow](#), a platform that we will use for you to upload your lab reports and other related lab assignments. For signup instructions please follow the link and review the pdf file that is located in Blackboard.

Course Delivery

This course will be delivered in a traditional face-to-face setting with students expected to attend class in person. In the event of the Covid-19 situation changing the course may be transferred into a hybrid setting.

Otherwise, this course will resemble a “pre-COVID” lecture – I will not be recording or live-streaming lectures. Consequently, missing class for any reason could be detrimental to your success in this course.

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. Activities such as worksheets and quizzes cannot be made up. You will not be automatically dropped if you stop attending class.

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	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 remotely outside of regular class time on the dates listed below:

Exam	Date	Room	Time
Exam 1	Thursday, Feb. 17	CAV 200 & 223	5:30 – 7:30 pm
Exam 2	Thursday, Mar. 24	CAV 200 & 223	5:30 – 7:30 pm
Exam 3	Thursday, Apr. 21	CAV 200 & 223	5:30 – 7:30 pm

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 for sale in the lab stockroom and from the [ACS web page](#).¹ The schedule for the 1311 final exams is shown below. The complete final exam schedule is also available on the [ASU web page](#).²

Sec	Days	Time	Instructor	Final Exam Date	Time
010	MWF	09:00 -09:50 am	Dr. Beran	Wed., May 11	08:00 am – 10:00 am
020	MWF	09:00 -09:50 am	Dr. Smith	Thur., May 12	08:00 am – 10:00 am
030	MWF	10:00 -10:50 am	Dr. Beran	Mon., May 9	10:30 am – 12:30 pm

Blackboard

Exam grades will be posted on [Blackboard](#).³ Just as IMPORTANTLY – Information and handouts will be posted on our Blackboard webpage.

Drop Dates

The last day to drop the course without creating an academic record: **Wednesday, February 2, 2022.**

The last day to drop the course with a grade of “W” is **Thursday, April 28, 2022.**

Information About COVID-19

Please refer to ASU's [COVID-19 \(Coronavirus\) Updates](#)⁴ web page for current information about campus guidelines and safety standards as they relate to the COVID-19 pandemic.

CHEM 1112 — GENERAL CHEMISTRY LABORATORY

Laboratory Meeting Times

The lab classes that accompany the CHEM 1311 lecture course are shown in the table below. The labs will meet first for pre-lab lectures in the Class Room listed in the table.

Section	Day	Meeting Time	Instructor	Class Room	Lab Room
04Z	R	02:00 pm – 04:50 pm	Mr. Rilling	CAV 219	CAV 212
05Z	M	11:00 am – 01:50 pm	Dr. Osborne	CAV 215	CAV 212
06Z	W	02:00 pm – 04:50 pm	Dr. Smith	CAV 215	CAV 212
07Z	R	11:00 am – 01:50 pm	Dr. Smith	CAV 215	CAV 212
08Z	T	02:00 pm – 04:50 pm	Dr. Osborne	CAV 215	CAV 212
09Z	M	02:00 pm – 04:50 pm	Dr. Osborne	CAV 215	CAV 212

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.

Labs activities begin the first week of the semester.

Laboratory Attire

Beginning on the first day of lab, everyone **MUST** have **approved goggles, long-sleeved shirts** which cover the midriff, **long pants**, and **shoes with closed toes and heels** (no sandals, slides, etc.). (Basically, you should have as little exposed skin as possible.) Anyone not wearing the appropriate attire will not be allowed into lab.

Lab Procedures and Lab Reports

We will be using the platform LabFlow by Catalyst Education for lab procedures, etc. You will have to register and to create an account with LabFlow by following this link:

[LabFlow Create Account](#)

A pdf document with more detailed instructions is provided in BlackBoard.

While you sign up you will be prompted to pay a fee of \$49.99.

The procedures for the labs will be posted within the LabFlow platform. The procedures will provide a description of the background for each experiment. You will be asked to complete pre-laboratory questions prior to the lab meeting within the LabFlow platform. Your instructor will communicate to you at what time the prelab assignments are due. The lab report itself will be uploaded to LabFlow and must be turned in by whichever due date your instructor requires. Each lab will be worth up to 100 points (up to 20 points for the prelab questions, and up to 80 points for the lab report).

Cleaning Up After Lab

Make sure that your lab area is clean and that all glassware and hardware has been cleaned and returned to the appropriate drawers before leaving the lab.

Make-Up Lab Policy

If you must miss a lab you will be turning in a lab report based on virtual data LabFlow will generate for you. You will have to seek permission from your instructor to be eligible to turn in a 100% virtual lab report. Your instructor will first work with you to attend another face-to-face lab section if that is feasible.

Lab Safety Training

All students enrolled in lab courses are required to take a Mandatory Laboratory Safety Training and Quiz on Blackboard. Instructions for completing the quiz are given below:

1. Login to Blackboard, and choose the course entitled: "Lab Safety and Chemical Hygiene."
2. Under the left-hand menu, choose: "Get Started Here".
3. Click on "Get Started Here" in the left-hand column.

4. Follow the instructions under “Welcome to Lab Safety and Chemical Hygiene Training!”

5. You must score 90% or higher on the lab safety quiz.

The Lab Safety Training must be completed by the evening of Sunday, August 29.

Lab Midterm and Final Exams

There will be a 100-point lab midterm (week of **March 7, 2022**) and a 100-point lab final exam (week of **May 2, 2022**).

LECTURE AND LAB SCHEDULE — SPRING 2022

Date	Week Of	Lecture	Lab
1	1/17	<i>Monday, Jan 17 MLK day no classes</i> Chapter 10: Intermolecular Forces Dipole-dipole forces, dispersion forces, polarity and solubility, vapor pressures, solubility of gases, phase diagrams, the solid state, structures of metals, ionic solids, crystal structures.	Labs Do Not Meet Stoichiometry, Basic Chemistry, and Significant Figures Review on LabFlow Only for students who have not completed this training before: Mandatory Lab Safety Training and Quiz — instructions given in <i>Lab Safety Training</i> section in BlackBoard (must be completed by Jan. 23 in BlackBoard)
2	1/24	<i>Chapter 10 continued</i>	Qualitative Analysis: Na ⁺ , K ⁺ , NH ₄ ⁺ , Ag ⁺ , Cu ²⁺ , Bi ³⁺
3	1/31	Chapter 11: Properties of Solutions Interactions between ions, vapor pressures of solutions, colligative properties, osmotic pressure	Qualitative Analysis: CO ₃ ²⁻ , PO ₄ ³⁻ , S ²⁻ , Cl ⁻ , I ⁻ , and NO ₃ ⁻
4	2/7	Chapter 11, cont.	Determination of the Molar Mass of a Solute using Freezing-Point Depression
5	2/14	Chapter 12: Chemical Kinetics Reaction rates, integrated rate laws, Arrhenius Equation, reaction mechanisms.	Beer's Law and Spectrophotometry
6	2/21	Chapter 12, cont.	Kinetics of an Iodine Clock Reaction
7	2/28	Chapter 13: Chemical Equilibrium	Determination of an Equilibrium Constant

		Dynamics of equilibria, equilibrium constants, Le Châtelier's Principle.	
8	3/7	Chapter 13, cont.	Le Châtelier's Principle Lab Midterm Exam (covering the lab material from week 1 through week 6)
9	3/14	Spring Break, no classes	No Labs
10	3/21	Chapter 14: Acid and Base Equilibria Strong and weak acids and bases, pH, pK _b , pK _a , pK _w , acidic and basic salts.	Determination of the Molar Mass and Identity of a Diprotic Acid
11	3/28	Chapter 14 continued	Buffer Solutions
12	4/4	Chapter 15: Equilibria of other Reaction Classes Common ion effect, buffer solutions, solubility product constant.	Determination of a Solubility Product Constant
13	4/11	Chapter 16: Thermodynamics Spontaneous process, entropy, free energy, chemical equilibrium.	Coordination Compounds
14	4/18	Chapter 16 continued	Entropy of Borax Dissolution
15	4/25	Chapter 17: Electrochemistry Voltaic cells, standard potential, concentration cells, batteries, fuel cells, corrosion. Thursday, April 28: Last Day to Drop	Voltaic Cells
16	5/02	Chapter 17, cont.	Lab Final Exam
17	5/09	Final Exams	

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](#)⁵
- [Angelo State University Catalog](#)⁶

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](#).⁷

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](#).⁸ 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

E-mails

For conducting official ASU business please use your official ASU e-mail account. Please make sure that you check your ASU.EDU account on a regular basis. The instructor may send important announcements regarding this course, homework, and/or exams to your ASU e-mail account. You will not be able to use the excuse of not checking your e-mail with regard to assignments, tasks, or exams you missed.

Virtual communication

Office hours and/or advising may be done with the assistance of the telephone, Collaborate, Skype, etc.

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](#)⁹ for more information.

Plagiarism

Plagiarism is a serious topic covered in ASU's [Academic Integrity policy](#)¹⁰ 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](#).¹¹

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](#)¹² for more information.

Title IX Statement

Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault, sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex.

You are encouraged to report any incidents involving sexual misconduct to the Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator, Michelle Boone, J.D. You may submit reports in the following manner:

Online: www.angelo.edu/incident-form

Face to Face: Mayer Administration Building, Room 210

Phone: 325-942-2022

Email: michelle.miller@angelo.edu

Note, as a faculty member at Angelo State, I am a mandatory reporter and must report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to someone in confidence about an issue, you may contact the University Counseling Center (325-942-2371), the 24-Hour Crisis Helpline (325-486-6345), or the University Health Clinic (325-942-2171).

For more information about resources related to sexual misconduct, Title IX, or Angelo State's policy please visit: www.angelo.edu/title-ix.

Modifications to the Syllabus

This syllabus, including grade evaluation and course schedule, is subject to modification. In particular, the COVID-19 pandemic may require significant changes in course delivery and content on potentially short notice.

Student Learning Outcomes

- **Learning Goal 1:** Students will be able to analyze complex chemical problems and draw logical conclusions.
 - Students will be able to use an understanding of atomic structure at the basic and atomic levels to analyze the structure and reactivity of substances and chemical species.
 - Students will be able to use an understanding of how energy interacts with matter to predict stable chemical species, and perform thermodynamic calculations describing chemical reactions.
- **Learning Goal 2a:** Students will be able to understand and apply scientific reasoning in the chemical sciences.
 - Students will be able to use an understanding of ions and molecules at the atomic level to predict the behavior of reactions in aqueous solutions.
 - Students will be able to use the basic ideas of quantum mechanics to describe how molecular bonds form and to predict molecular shape and polarity. Molecular structure and polarity will be used to predict the forces between molecules and relate those forces to the states of matter and phase changes.
- **Learning Goal 2b:** Students will be able to employ mathematics in the analysis of chemical problems.
 - The mole concept, chemical formulas and balanced chemical equations will be used to do chemical calculations that relate macroscopic measurements to numbers of atoms, ions or molecules.

- Students will be able to do calculations involving solution concentration and know how to prepare solutions of given concentrations.
- Students will be able to quantitatively predict gas properties using gas law calculations.
- **Learning Goal 3:** Students will be able to demonstrate technical and analytical skills in chemistry.
 - Students will be able to use the periodic table to determine basic atomic information and to predict trends in atomic properties.
 - Students will be able to interconvert between chemical names and formulas to the extent that they can work problems given only one of those pieces of information.
 - Students will be able to classify common types of chemical reactions and predict the outcomes of reactions.

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 <http://blackboard.angelo.edu> (or access Blackboard from RamPort)

⁴ <https://www.angelo.edu/covid-19/>

⁵ <https://www.angelo.edu/student-handbook/>

⁶ <https://www.angelo.edu/catalogs/>

⁷ <https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>

⁸ <https://www.angelo.edu/services/disability-services/>

⁹ <https://www.angelo.edu/content/files/14197-op-1011-grading-procedures>

¹⁰ <https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>

¹¹ https://www.angelo.edu/dept/writing_center/academic_honesty.php

¹² <https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of>