



## Course Syllabus

### **CHEM 1412 – General Chemistry II**

**Catalog Description:** 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 CHEM 1412; introduction of the scientific method, experimental design, chemical instrumentation, data collection and analysis, and preparation of laboratory reports.

**Prerequisites:** CHEM 1311 and CHEM 1111, or CHEM 1411 General Chemistry I (Lecture and Laboratory)

**Semester Credit Hours:** 4

**Lecture Hours per Week:** 3

**Lab Hours per Week:** 3

**Extended hours:** 0

**Contact Hours per Semester:** 96

**State Approval Code:** 40.0501.57 03

**Class Section Meeting Time:**

#### **Core Components and Related College Student Learning Outcomes**

This course counts as part of the academic requirements of the Panola College Core Curriculum and an Associate of Arts or Associate of Science degree.  Yes  No: If no, skip to Instructional Goals.

The items below marked with an X reflect the state-mandated outcomes for this course **IF this is a CORE course:**

- Critical Thinking Skills – to include creative thinking, innovation, inquiry and analysis, evaluation and syntheses of information
  - CT1: Generate and communicate ideas by combining, changing, or reapplying existing information
  - CT2: Gather and assess information relevant to a question
  - CT3: Analyze, evaluate, and synthesize information
- Communication Skills – to include effective development, interpretation, and expression of ideas through written, oral, and visual communication
  - CS1: Develop, interpret, and express ideas through written communication
  - CS2: Develop, interpret, and express ideas through oral communication
  - CS3: Develop, interpret, and express ideas through visual communication
- Empirical and Quantitative Skills – to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
  - EQS1: Manipulate and analyze numerical data and arrive at an informed conclusion
  - EQS2: Manipulate and analyze observable facts and arrive at an informed conclusion

- Teamwork – to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal
  - TW1: Integrate different viewpoints as a member of a team
  - TW2: Work with others to support and accomplish a shared goal
- Personal Responsibility – to include the ability to connect choices, actions, and consequences to ethical decision-making
  - PR1: Evaluate choices and actions and relate consequences to decision-making
- Social Responsibility – to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities
  - SR1: Demonstrate intercultural competence
  - SR2: Identify civic responsibility
  - SR3: Engage in regional, national, and global communities

### **Instructional Goals and Purposes:**

Chemistry 1412 is the second of a two semester general college chemistry course. The prerequisite for the course is successful completion of Chemistry 1411. There is a required laboratory section which meets once a week for four hours. The second semester course covers thirteen chapters of the text, surveying topics in materials, kinetics, equilibria, thermodynamics, electrochemistry, oxidation-reduction reactions, nonmetal and coordination chemistry, and nuclear chemistry, with a brief introduction to organic chemistry.

Chemistry 1412 has a required laboratory component that forms an important portion of this study. Experiment results will be recorded in a bound laboratory notebook. Lab reports will be submitted in Canvas.

Course Objectives: (that will be assessed)

1. Understand and be able to explain the general principles, laws, and theories of chemistry that are discussed and presented throughout the semester
2. Use critical thinking and logic in the solution of problems
3. Apply learned chemistry skills to new situations
4. Demonstrate an understanding of chemistry through technological advancement
5. Apply chemical principles in the laboratory setting

Course Objectives: (not assessed)

1. Develop independent and cooperative learning skills
2. Recognize and acquire attitudes that are characteristic of the successful worker regardless of the major field of study
3. Develop an awareness of the value of chemistry in our daily living

### **Learning Outcomes: [from the ACGM catalog]**

After studying all materials and resources presented in the course, the student will be able to:

1. State the characteristics of liquids and solids, including phase diagrams and spectrometry.
2. Articulate the importance of intermolecular interactions and predict trends in physical properties.
3. Identify the characteristics of acids, bases, and salts, and solve problems based on their

quantitative relationships.

4. Identify and balance oxidation-reduction equations, and solve redox titration problems.
5. Determine the rate of a reaction and its dependence on concentration, time, and temperature.
6. Apply the principles of equilibrium to aqueous systems using LeChatelier's Principle to predict the effects of concentration, pressure, and temperature changes on equilibrium mixtures.
7. Analyze and perform calculations with the thermodynamic functions, enthalpy, entropy, and free energy.
8. Discuss the construction and operation of galvanic and electrolytic electrochemical cells, and determine standard and non-standard cell potentials.
9. Define nuclear decay processes.
10. Describe basic principles of organic chemistry and descriptive inorganic chemistry.

#### **Course Content:**

A general description of lecture/discussion topics included in this course are listed in the Learning Outcomes section of this syllabus.

Students in all sections of this course will learn the following content:

1. List factors that affect reaction rates.
2. Write rate laws.
3. Compare first and second order reactions.
4. Determine, using the collision model, the effect of temperature on rates of reactions.
5. Define reaction mechanisms.
6. Describe elementary reactions.
7. Describe and give examples of 2 types of catalysts.
8. Describe equilibrium in terms of LeChatelier's principle.
9. Write equilibrium constant expressions.
10. Calculate equilibrium constants.
11. Compare and contrast the 3 acid – base models.
12. Perform pH calculations.
13. Distinguish between strong and weak acids and bases.
14. Show the mathematical relationship between  $K_a$  and  $K$ .
15. Using the common-ion effect, calculate the concentrations of ions in buffer solutions.
16. List the factors that affect solubility.
17. Describe a qualitative analysis scheme suitable for separating a selected list of metal ions.
18. Describe the atmosphere and problems that the atmosphere is experiencing in chemical terms.
19. List current freshwater challenges.
20. Provide evidence of the importance of green chemistry.
21. List the 2<sup>nd</sup> and 3<sup>rd</sup> laws of Thermodynamics.
22. Compare entropy and enthalpy.
23. Solve problems using the Gibbs Free Energy relationships.
24. Balance redox equations.
25. Distinguish between voltaic and electrolytic cells.
26. Calculate cell EMF under specified conditions.
27. Compare types of batteries.
28. Describe the effects of electrolysis and methods to control electrolysis.

29. Describe nuclear reactions.
30. Track nuclear transmutations from starting radioactive atom to stable atom.
31. Describe biological effects of radiation.
32. List the periodic properties of metals and nonmetals.
33. Name coordination compounds and write their formulas.
34. Explain the chemical source of color in vision.
35. Use crystal field theory to explain molecular phenomena that other bonding theories do not explain.
36. List the IUPAC nomenclature for common classes of organic compounds.
37. Draw the structures for common classes of organic compounds.

### **Methods of Instruction/Course Format/Delivery:**

Lecture, flipped and semi-flipped formats, video/screencast lecture, class discussion, lecture activities, reading assignments, homework, quizzes, research, presentation, pre-laboratory activities, laboratory experimentation, laboratory reports

**Students are expected to spend time outside of class each week reading, reviewing, and participating in assigned activities for successful completion of this course.**

### **Major Assignments / Assessments:**

The following categories, containing assignments and assessments, will be used to calculate the student's final grade. At the instructors' discretion, the following components may or may not be used or modified, extra points may be earned and assignment grades may be adjusted, dropped and/or replaced.

**LATE OR MAKE-UP WORK (homework, quizzes, participation and lecture activities, assignments, laboratory experiments, exams, service learning project and all other assignments made by the instructor):** To receive a grade the work must be turned in within 7 days of the original assignment due date and your grade will be reduced by 30 percent. If the reason for the late or make-up assignment is because of your participation in an approved Panola College activity, your grade will not be reduced by 30 percent; however, the assignment must be turned in within 7 days of the original assignment due date.

#### **1. Homework, Quizzes, Application Assignments, Participation and Lecture**

**Activities:** These assignments may vary in points.

- **Homework (in Mastering Chemistry)** - completed and turned in using the online system called Mastering Chemistry (also known as MyLab and Mastering) and/or other methods of delivery, which is designed to accompany the textbook. The Mastering Chemistry code may be purchased as a bundle with the book in the Panola College Bookstore. It may also be purchased separately online. **The tab or menu button to get to this system is located in Canvas on the left side of the screen on the course homepage.**

For homework to be most useful in preparing for in class work and exams, it must be submitted by the date due. There is ample time allowed for completion and you have access 24/7. Registration instructions for MyLab and Mastering are located in Canvas. Make sure you have the latest free download of adobe flash player and any other required free software.

- **Homework (not in Mastering Chemistry)** – may be assigned at the discretion of the instructor, such as, exercise questions and key terms found at the end of each chapter in the textbook and etc., to address special study needs.
- **Application assignments** – These assignments may be assigned periodically and are completed and turn in separately from mastering chemistry. These assignments are designed to help the student see the real world applications of chemistry and understand how to research/present scientific information from an article.
- **Participation and Lecture Activities** – exercises/activities performed in class or online as participation in the lesson, **quizzes in class or online**. These activities are given as needed and possibly without prior notice.

2. **Laboratory Experiments:**

**FOR LAB STUDENTS WHO ATTEND LABS AT PANOLA COLLEGE** – Laboratory experiments will be performed in order to apply the general principles, laws and theories of chemistry learned during lecture. Experimental results will be recorded and submitted on the form provided in lab.

- The laboratory course information and specific procedures will be provided and discussed in the mandatory laboratory orientation by your lab instructor. **No student will be allowed to begin any experiments in the lab without going through lab orientation AND without the pre-lab reports-assignments being completed.** The lab instructor has the authority to remove 10 points from your laboratory report for each expectation in the laboratory guidelines that is not followed by the student. Removal of points or removal of the student from class is by instructor discretion and based on previous warning or the gravity of the infraction. **NO ONE WILL BE ALLOWED TO PUT YOU OR OTHERS AT RISK IN THE LAB.** Students must follow all expectations as described in the Lecture and Laboratory course information document in order to remain in lab class. This section specific syllabus is located in Canvas. One copy will be given to all face to face students. Safety is most important.
  - The grade of 100 possible points for each laboratory experiment is broken down as follows:
    - 20 possible points for showing up on time with the pre-lab assignment complete;** as assigned in Canvas or otherwise by your instructor. The pre-lab assignment may include a **pre-lab report-assignment**, a **pre-lab quiz** and **MSDS information**. This is your ticket in the door and you will not begin an experiment without having met all of the requirements. This also includes conducting the experiment, adhering to all safety and equipment use rules, completing the experiment, cleaning up your lab station, and disposing of all waste/trash according to instructions given. All of these items must be complete before leaving lab, if incomplete, 10 points will be removed.
    - In order to receive the above 20 points in the grade book, the required documentation must be turned in with lab instructor initials.
    - 80 possible points for the Lab Report Sheet(s) you turn in.** It must be complete, legible, and information must be properly presented and clearly explained when necessary. All work must be shown when necessary to receive full credit.

- ii. Missing a lab-
  1. **No more than 2 missed labs may be made up. No exceptions, reason doesn't matter.**
  2. **The missed lab must be made up within 7 days of the original lab date.** It is the student's responsibility to make arrangements, time and date, with the lab instructor to make up the missed lab. **No additional make up lab times will be available.** Once the new lab is set up, previous labs will not be offered for make-up.

**Cell phones in lab- NO CELL PHONES IN LAB!!!!** If you have a situation where you may need to take a call, then you will leave the phone at the instructor table to be answered by you when/if it rings. If you have your phone out or are using your phone without permission for any reason, you will lose all points of your participation grade but are required to complete the experiment. This is a violation of safety rules and putting others or you at risk will not be tolerated.

3. **Unit Exams** – the chapters that make up each unit exam will be posted in your Canvas course. Unit exams will be given throughout the semester and are worth 100 points each.

Each exam will be given in class on the date set by the instructor. The time limit of 55 minutes may require extra time or the test may be taken in parts. You need a pencil/pen and your calculator for each exam. Other testing aids may be provided by the instructor as appropriate.

**Absences on exam days:** Absences on exam days are not excused for ANY reason other than approved Panola College activities. Students with excused absences may take a make-up exam similar to the one given at a time convenient to the instructor. **The make-up exam may be in a different format than the original exam e.g. comprehensive, all essay/problems and etc.**

4. **Research Paper** - Each student will research a topic chosen by the student and approved by the instructor. Each student will write and turn in a research paper on this topic during the regular semester. Due dates for topics and the paper is located in Canvas. **There is also a module in Canvas with the specific instructions and due date.** This project is part of the Unit Exam grade section.
5. **Final Exam** – may be comprehensive, therefore you should prepare for this exam throughout the semester. Additional information will be posted in Canvas towards the end of the semester.

## **Classroom Policies**

**Attendance** – is expected at all labs. Attendance in lecture and lab is required for course completion. Class attendance is monitored and recorded. However, this level of instruction includes expected personal responsibility that will not always be addressed. YOU are responsible for missed information. Attendance WILL affect your grade because you probably missed something you needed to learn how to do. For excused absences, it is your responsibility to contact me about what you missed. Please see syllabus and make up work policies before you ask. See the handbook for rules concerning allowed absences.

**NO CELL PHONES-** Cell phones are not allowed to be used as calculators in class or lab.

**Withdrawal Policy:** A student may need to withdraw from the course before the semester's end. It is the student's responsibility to complete and submit the appropriate forms (as provided by the student success office) on or before the withdrawal date. The withdrawal date is posted on the college academic calendar. A student who ceases to attend class without formal withdrawal will receive a grade of "F" for the course. The instructor reserves the right to withdraw a student from the course in accordance with college policy. Students should consider that they may only drop 6 total courses during their college tenure.

**Incomplete Grade:** An Incomplete grade is a temporary grade given to a student who is unable to complete the course as the result of an authorized absence (i.e. serious illness or emergency). Incomplete grades will only be approved by the instructor for students who have maintained good standing in the course. All incompletes must be further approved by the Vice President of Instruction. Students should note that an incomplete grade ("I") has the effect of an "F" on their GPA. The "I" will be removed once the student completes the course. Students have a maximum of six weeks to complete the course from the semester's end or they will receive a grade of "F" for the course.

**Classroom Etiquette:** Students should arrive on time and remain in class until the full class period has expired. Appropriate dress attire should be worn (i.e. no pajamas or overly revealing attire), headwear should be removed, and students should be respectful (in language and behavior) toward one another and the instructor. **Students are highly encouraged to engage the class by participating in class discussions and asking appropriate questions. The standards of student conduct must be maintained with the instructor outside of class and in all electronic communication with the instructor or other students.**

Cell phones, computers, and all other electronic devices must be turned off before the beginning of class unless indicated by the instructor. Students shall be allowed to record lectures but their recording device must be placed at the front of the class on or near the instructor. Recording a lecture does not excuse a student from attending class.

At all times students are expected to uphold the standards of student conduct as defined in the Student Handbook. A failure to comply with these conditions will result in removal from the classroom and an absent mark on the attendance record.

**Internet Etiquette:** All online users should take great care in their internet behavior. Students are expected to remain respectful in all electronic communication as any publicly or privately shared media will be viewed by others. This communication includes all written material, submitted assignments, pictures, audio recordings, and video recordings. The instructor reserves the right to remove online submissions that contain inappropriate or obscene material. Students who violate proper internet etiquette in an assignment shall fail the assignment on the first offense and shall fail the class upon the second offense.

No user shall post personal or confidential information concerning another party without their express permission. No student shall copy, alter or share files of course material submitted by another student. All of the standards of the academic honesty policy shall apply to all online course material. Students shall be held accountable for posting libelous or obscene material on any electronic forum hosted or expressly regulated by the college under user agreement. The instructor and the college reserve the right to remove said material and hold disciplinary actions in accord with college policy. At all times students are expected to uphold the standards of student conduct as defined in the Student Handbook. The instructor and the college shall have the right to remove a student from the course (resulting in a failing grade) and take appropriate disciplinary actions (as defined by the student handbook) for violating any of the aforementioned policies.

**Cheating:** "Cheating" is defined as unauthorized help on an examination or assigned course material.

A student must not receive from any other student or give to any other student any information, answers, or help during an exam. A student must not "steal" the answers from an unsuspecting student during an exam.

A student must not use any sources for answers during an exam (including, but not limited to: notes, books, or electronic devices) without prior authorization from the professor.

A student must not obtain exam questions illegally, tamper with the exam questions, nor change the results of an exam after it has been graded.

All cheating infractions will result in a grade of "0" for the assignment. A student will fail the class upon their second cheating offense. This policy shall be adhered to unless mitigating circumstances should prove a lesser penalty should apply.

Students shall have the right to contest a cheating claim. The appeals process is specifically defined in the student handbook.

**Plagiarism:** "Plagiarism" is defined as the taking of a person's ideas, words, or information and claiming those properties as one's own. The use of all ideas, words, or information from any source must be properly referenced and due credit must be given to its author.

All class assignments must be submitted through Canvas. Canvas will run the submitted assignments through [turnitin.com](https://turnitin.com). Any assignment which scores higher than 40% on copied material will automatically receive a grade of "0". Properly quoting and citing borrowed information is NOT plagiarism. However, since the integrity of the assignment is based upon the originality of the student's work, no student may turn in a paper which exceeds a 30% score in properly quoted and cited material.

The instructor reserves the right to employ other means outside of [turnitin.com](https://turnitin.com) to check the "originality" of a student's work. Students shall have the right to contest a plagiarism or cheating claim. The appeals process is specifically defined in the student handbook.

All plagiarizing infractions will result in a grade of "0" for the assignment. A student will fail the class upon their second plagiarizing offense. This policy shall be adhered to unless mitigating circumstances should prove a lesser penalty should apply.

**Privacy Policy:** The instructor will uphold the privacy of a student's grades, disability, and all other personal information in accord with school policy, state and federal law.

A student perpetually maintains the right to review their course grades. A student's right to review their grades shall not be interpreted as the right for the release of an instructor's grading keys.

The instructor and the college do not assume responsibility for the disbursement of any grade information a student freely gives of himself in private correspondence or in a public forum. The instructor reserves the right to remove grade information which a student freely reveals of him or herself in an online public forum hosted or regulated by the college to preserve the integrity of the course.

The instructor reserves the right to pursue disciplinary and legal action against any student who illicitly obtains and reveals private instructional information, including, but not limited to answer keys or class grades.

**Disability Policy:** Students with a learning disability must verify their disability with the Career/Technical Advisor in the Student Success Office. The student is responsible for presenting proper verification to the instructor at the beginning of the course. Upon verification, the instructor shall make the appropriate accommodations for the student. The instructor shall not implement special accommodations for students whose disability has not been verified by the college. The instructor is not responsible for a student's poor class performance before verification is presented.

Students with a condition that may require emergency assistance (i.e. seizures, pacemaker malfunctions, hyperventilation, etc) should meet with the instructor in private to discuss emergency procedures.

A disability does not exempt a student from proper classroom etiquette or the student code of conduct.

This class will fully comply with the college handbook, state, and federal laws.

### **Instructor Philosophy:**

Chemistry is a core discipline essential to a college education regardless of major or career choice. Recognizing a broad range of interests, preparations, and future needs among chemistry students, this course is designed to allow each student to individually select topics for various assignments in order to further develop possible career choices. Every attempt by the instructor is made to ensure your area of interest is discussed. Please let the instructor know if there is a topic

that particularly interests you.

Organization is a key to success in this course. We highly recommend a notebook or a three ring binder to keep up with all assignments, quizzes, homework and exams. For example, if there is a problem with the homework system and you can show me your work, I am able to give you credit.

Our goal is for you to be successful in this course. Please do not hesitate to come by the office for help. If the office hours conflict with your schedule, every effort will be made to arrange an alternative time. We cannot fix what we are not aware of so communication is a must. Please know that Canvas Email is the best way to get a quicker response since the office phone is not typically accessed from home after school hours.

**Changes to this syllabus, how class is conducted, and how grades are calculated may occur by the instructor if deemed best for student learning and success.**

**Canvas:**

This course is available on Canvas and will contain all information necessary for the course. Canvas is also the method in which you will contact me, make any necessary appointments, access information, receive announcements, take quizzes, do your homework, and watch screen casts. Please make sure you know how to use it. **Make sure you have the latest free download of adobe flash player.** There are canvas orientations through the distance learning office you may attend for assistance.

**Course Grade:**

The grading scale for this course is as follows:

1. Homework and lecture activities 20%
2. Labs 25%
3. Unit Exams 40%
4. Final Exam 15%

**Letter Grades are as Follows:**

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

**Texts, Materials, and Supplies:**

1. Chemistry: Structure and Properties 2nd ed. by Nivaldo J. Tro.
2. Mylab and mastering access code (homework registration necessary for online homework)
3. General Chemistry in the Laboratory. Amy Calhoun (sold only in the Panola College bookstore)
4. Laboratory notebook (sold in the Panola College bookstore)
5. SCIENTIFIC CALCULATOR (no cell phones) (it does NOT need to be graphing)
6. Safety glasses

**Required Readings:**

may include, but not limited to:

- Textbook, laboratory manual, journal articles, and other relevant scientific material

**Recommended Readings:**

may include, but not limited to:

- Journal articles, relevant scientific material and scientific research

**Other:**

- For current texts and materials, use the following link to access bookstore listings: <http://www.panolacollegestore.com>
- For testing services, use the following link: <http://www.panola.edu/elearning/testing.html>
- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Charles C. Matthews Student Center or go to <http://www.panola.edu/student-success/disability-support-services/> for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook, *The Pathfinder*: <http://www.panola.edu/student-success/documents/pathfinder.pdf>