

CHEM133 16

STUDENT WARNING: This course syllabus is from a previous semester archive and serves only as a preparatory reference. Please use this syllabus as a reference only until the professor opens the classroom and you have access to the updated course syllabus. Please do NOT purchase any books or start any work based on this syllabus; this syllabus may NOT be the one that your individual instructor uses for a course that has not yet started. If you need to verify course textbooks, please refer to the online course description through your student portal. This syllabus is proprietary material of APUS.

Course Summary

Course : CHEM133 **Title :** General Chemistry I with Lab

Length of Course : 16

Prerequisites : N/A **Credit Hours :** 4

Description

Course Description: This is the first course of a two-course general chemistry sequence that introduces students to the principles, terminology, methodology and worldview of chemistry. Lecture and lab topics are both descriptive and mathematical and include matter, measurement and problem solving, atomic theory and structure, the periodic table, nomenclature, physical properties of gases, liquids, and solids, molecular bonding and geometry, stoichiometry, thermochemistry, types of chemical reactions, and solution chemistry. The laboratory component of this course is hands-on and designed for science students to learn how to make qualitative and quantitative observations about physical and chemical phenomena, make calculations, and test their own reasoning. Students will acquire skills in laboratory techniques designed to help reinforce and build upon the concepts presented in the lecture portion of the class. Students must have a safe work area available to perform laboratory activities, including working with an open flame. Students must be able to document their laboratory work using digital pictures and/or video. Students must also have room temperature storage available in order to maintain laboratory materials through both CHEM133 and CHEM134. Lab material for this course will only be provided once. If you need replacement lab equipment for any reason or need to retake the course later, you will need to purchase your own lab refills. This is a time and resource-intensive course. Students intending to use this course to satisfy prerequisites for pre-professional programs should verify that the CHEM133 and CHEM134 course sequence meets the requirements of their intended program prior to enrollment. In order to be successful in this course, it is recommended that students will have completed high school chemistry or a basic college equivalent, and be comfortable with basic algebra, including manipulation of equations.

Course Scope:

This course is designed to teach the principles of general chemistry and its laboratory to students who are science majors. It will introduce general inorganic chemical theory, terminology, nomenclature, problem solving, and methodology, and provide a solid foundation of chemistry for subsequent science courses.

Objectives

The successful student will fulfill the following learning objectives, and upon completion of this course, should be able to:

CO-1 Demonstrate basic knowledge of problem solving, measurement, dimensional analysis, matter, energy, physical vs. chemical changes/properties, and the principles, methods, history, and terminology of general chemistry.

CO-2 Describe/define atoms vs. elements, early ideas about matter vs. modern atomic theory, atomic structure, subatomic particles and their properties, periodicity on the Periodic Table, and the relationship of Avogadro's number to calculations involving atoms and mass.

CO-3 Demonstrate basic knowledge of chemical formulas, molecular modeling, bonding (ionic vs. covalent), elements vs. compounds, chemical nomenclature, compositional calculations, and writing and balancing chemical equations.

CO-4 Apply concepts of reaction stoichiometry, percent yield, solution concentration, types of aqueous solutions, and types of chemical reactions in chemical calculations and related product formation.

CO-5 Solve mathematical and chemical problems related to pressure, temperature, volume, and moles as related to Simple Gas Laws, the Ideal Gas Law, Molar Mass and Molar Volume, STP, Dalton's Law, Gas Stoichiometry, the Kinetic Molecular Theory, Mean Free Path, and the van der Waal's equation.

CO-6 Demonstrate a basic knowledge of heat, work, and energy as related to calculations involving the First Law of Thermodynamics, thermal equilibrium, heat capacity, pressure-volume work, calorimetry, and enthalpies of reaction and formation.

CO-7 Describe/define the nature of electromagnetic radiation, atomic spectroscopy and emission spectra, the Bohr model, the de Broglie Wavelength, the Uncertainty Principle, Indeterminacy, quantum mechanics, and atomic orbitals as related to calculations involving energy, amplitude, wavelength and frequency.

CO-8 Predict, using the Periodic Table and knowledge of its development, electron configurations, valence electron numbers and behavior, periodic trends in size, effective nuclear charge, magnetic properties, ionization energy, electron affinities, metallic character, and behavior of some of the main group elements.

CO-9 Apply Lewis Theory and VSEPR Theory to ionic and covalent chemical bonding, dot structures, Lewis Structures, lattice energy, the Born-Haber cycle, electronegativity, bond and molecular polarity, resonance, formal charge, incomplete octets, expanded octets, odd-electron species, bond energies, bond length, The Electron Sea Model, molecular geometry and shape, overlap and hybridization of atomic orbitals, and electron delocalization.

CO-10 Demonstrate a basic knowledge of the properties (and related calculations) of liquids, solids, gases, intermolecular forces, vaporization and vaporization pressure, sublimation/fusion, phase diagrams, heat of fusion/vaporization, the unique properties of water, crystalline solids, and Band Theory.

Outline

Week 1: Lesson 1: Essential Ideas & Atoms, Molecules, and Ions

Course Objectives

CO-1; CO-2

Reading/Viewing

Syllabus

Academic Honor Pledge

Lesson 1: Part 1

OpenStax Text: Chapters 1 & 2

Lab 1: Accuracy and Precision

Supplemental Media/Content:

See links within Lesson 1

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Academic Honor Pledge

Lab 1

Forum 1 - Introduction Forum

Initial Post Due: Sunday of Week 1, by 11:55 p.m., ET (**please** try to post earlier--preferably by Wednesday)

Responses Due: Sunday of Week 1, by 11:55 p.m., ET

Week 2: Lesson 1: Essential Ideas & Atoms, Molecules, and Ions

Course Objectives

CO-1; CO-2

Reading/Viewing

Lesson 1: Part 2

OpenStax Text: Chapters 1 & 2

Lab 2: Chemistry Lab Safety

Supplemental Media/Content:

See links within Lesson 1

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Lesson 1 Quiz

Lab 2

Forum 2

Initial Post Due: Thursday of Week 2, by 11:55pm ET

Responses Due: Sunday of Week 2, by 11:55pm ET

Week 3: Lesson 2: Composition of Substances and Solutions & Stoichiometry of Chemical Reactions

Course Objectives

CO-3; CO-4

Reading/Viewing

Lesson 2: Part 1

OpenStax Text: Chapters 3 & 4

Lab 3: Compound Formulas

Supplemental Media/Content:

See links within Lesson 2

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Lab 3

Forum 3

Initial Post Due: Thursday of Week 3, by 11:55pm ET

Responses Due: Sunday of Week 3, by 11:55pm ET

Week 4: Lesson 2: Composition of Substances and Solutions & Stoichiometry of Chemical Reactions

Course Objectives

CO-3; CO-4

Reading/Viewing

Lesson 2: Part 2

OpenStax Text: Chapters 3 & 4

Lab 4: Qualitative Analysis of Ions

Supplemental Media/Content:

See links within Lesson 2

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Lesson 2 Quiz

Forum 4

Initial Post Due: Thursday of Week 4, by 11:55pm ET

Responses Due: Sunday of Week 4, by 11:55pm ET

Week 5: Lesson 3: Electronic Structure and Periodic Properties of Elements

Course Objectives

CO-7; CO-8

Reading/Viewing

Lesson 3: Part 1

OpenStax Text: Chapter 6

Lab 4: Qualitative Analysis of Ions (cont'd)

Supplemental Media/Content:

See links within Lesson 3

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Lab 4

Forum 5

Initial Post Due: Thursday of Week 5, by 11:55pm ET

Responses Due: Sunday of Week 5, by 11:55pm ET

Week 6: Lesson 3: Electronic Structure and Periodic Properties of Elements

Course Objectives

CO-7; CO-8

Reading/Viewing

Lesson 3: Part 2

OpenStax Text: Chapter 6

Lab 5: Electron Configuration

Supplemental Media/Content:

See links within Lesson 3

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Lesson 3 Quiz

Lab 5

Forum 6

Initial Post Due: Thursday of Week 6, by 11:55pm ET

Responses Due: Sunday of Week 6, by 11:55pm ET

Week 7: Lessons 1 – 3 Review & Midterm Exam

Course Objectives

CO-1; CO-2; CO-3; CO-4; CO-7; CO-8

Reading/Viewing

Lessons 1 – 3

OpenStax Text: Chapters 1-4, 6

Labs 1 – 5

Supplemental Media/Content:

See links from Lessons 1 – 3

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Midterm Exam

Forum 7

Initial Post Due: Thursday of Week 7, by 11:55pm ET

Responses Due: Sunday of Week 7, by 11:55pm ET

Week 8: Lesson 4: Chemical Bonding and Molecular Geometry

Course Objectives

CO-9

Reading/Viewing

Lesson 4: Part 1

OpenStax Text: Chapter 7

Lab 6: Chemical Bonding

Supplemental Media/Content:

See links within Lesson 4

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Forum 8

Initial Post Due: Thursday of Week 8, by 11:55pm ET

Responses Due: Sunday of Week 8, by 11:55pm ET

Week 9: Lesson 4: Chemical Bonding and Molecular Geometry

Course Objectives

CO-9

Reading/Viewing

Lesson 4: Part 2

OpenStax Text: Chapter 7

Lab 6: Chemical Bonding (cont'd)

Supplemental Media/Content:

See links within Lesson 4

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Lesson 4 Quiz

Lab 6

Forum 9

Initial Post Due: Thursday of Week 9, by 11:55pm ET

Responses Due: Sunday of Week 9, by 11:55pm ET

Week 10: Lesson 5: Advanced Theories of Covalent Bonding

Course Objectives

CO-9

Reading/Viewing

Lesson 5: Part 1

OpenStax Text: Chapter 8

Lab 7: Gravimetric Analysis

Supplemental Media/Content:

See links within Lesson 5

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Forum 10

Initial Post Due: Thursday of Week 10, by 11:55pm ET

Responses Due: Sunday of Week 10, by 11:55pm ET

Week 11: Lesson 5: Advanced Theories of Covalent Bonding

Course Objectives

CO-9

Reading/Viewing

Lesson 5: Part 2

OpenStax Text: Chapter 8

Lab 7: Gravimetric Analysis (cont'd)

Supplemental Media/Content:

See links within Lesson 5

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Lesson 5 Quiz

Lab 7

Forum 11

Initial Post Due: Thursday of Week 11, by 11:55pm ET

Responses Due: Sunday of Week 11, by 11:55pm ET

Week 12: Lesson 6: Liquids and Solids

Course Objectives

CO-10

Reading/Viewing

Lesson 6: Part 1

OpenStax Text: Chapter 10

Lab 8: Separation by Chromatography

Supplemental Media/Content:

See links within Lesson 6

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Forum 12

Initial Post Due: Thursday of Week 12, by 11:55pm ET

Responses Due: Sunday of Week 12, by 11:55pm ET

Week 13: Lesson 6: Liquids and Solids

Course Objectives

CO-10

Reading/Viewing

Lesson 6: Part 2

OpenStax Text: Chapter 10

Lab 8: Separation by Chromatography (cont'd)

Supplemental Media/Content:

See links within Lesson 6

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Lesson 6 Quiz

Lab 8

Forum 13

Initial Post Due: Thursday of Week 13, by 11:55pm ET

Responses Due: Sunday of Week 13, by 11:55pm ET

Week 14: Lesson 7: Gases & Thermochemistry

Course Objectives

CO-5; CO-6

Reading/Viewing

Lesson 7: Part 1

OpenStax Text: Chapters 9 & 5

Lab 9: Gas Laws

Supplemental Media/Content:

See links within Lesson 7

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Lab 9

Forum 14

Initial Post Due: Thursday of Week 14, by 11:55pm ET

Responses Due: Sunday of Week 14, by 11:55pm ET

Week 15: Lesson 7: Gases & Thermochemistry

Course Objectives

CO-5; CO-6

Reading/Viewing

Lesson 7: Part 2

OpenStax Text: Chapters 9 & 5

Supplemental Media/Content:

See links within Lesson 7

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Lesson 7 Quiz

Lab 10

Forum 15

Initial Post Due: Thursday of Week 15, by 11:55pm ET

Responses Due: Sunday of Week 15, by 11:55pm ET

Week 16: Lesson 4 – 7 Review & Final Exam

Course Objectives

CO-5; CO-6; CO-9; CO-10

Reading/Viewing

Lessons 4 – 7

OpenStax Text: Chapters 7-10 & 5

Labs 6 – 9

Supplemental Media/Content:

See links from Lessons 4 – 7

Assignments (Due date ends at 11:59 pm Eastern Time)

Due by Sunday:

Final Exam

Forum 16

Initial Post Due: Thursday of Week 16, by 11:55pm ET

Responses Due: Sunday of Week 16, by 11:55pm ET

Evaluation

Several types of graded assessments/activities will be assigned to enhance your understanding of chemistry principles. Participation in all of the activities is essential for developing problem solving skills and concepts presented in the course. Your course grade is based on your performance on the following activities:

Discussion Forums:

There will be a Discussion Forum or each week in this course (the length of each Lesson is 2 weeks). *There will also be a required introductions discussion forum during the first week of the course, as well as a required study forum during the weeks of the midterm and final.* You are to post a thoughtful post after reading the instructions for each forum, expressing critical thought and analysis. You are then required to **post a response to the post of at least 2 of your classmates** as well. There will be a total of 14 discussion forums and 2 study forums. Please do not plagiarize your answer (i.e. do not copy paste directly from the internet or any other source) or you will not receive credit. There are many tools available for instructors to help catch this, so please don't try it.

NOTE: Brief statements, saying something very vague, or congratulatory or acknowledgement-type postings will not count towards adequate participation credit. They do not contribute to an understanding of the material, raise important issues regarding the material, or forward the conversation about the content.

See the link in the Lessons area for due dates and a rubric to see expectations and how the discussion forums will be graded.

Lesson Quizzes:

There will also be quizzes in the Tests & Quizzes area of the classroom. These quizzes will help you and your Professor assess your comprehension of the Lesson material. There are 7 quizzes, each worth 100 points. You will have **90 minutes** to complete each quiz—after **90 minutes**, the assessment will be submitted automatically and you will only be able to receive credit for what you have completed at that time.

Labs:

After completing the labs for each lesson, you will complete an assignment in the Tests & Quizzes area of the

classroom. Though they are being delivered in the Tests & Quizzes area, they are not technically quizzes. You should think of them simply as assignments that accompany the lab exercise that happen to be delivered in a quiz format. Each lab assignment will consist of multiple choice and short answer questions, as well as the requirement of uploading pictures and your own data (see instructions within each lab). These lab assignments are **not timed**. You will not be able to answer the questions without performing the lab and generating your own individual data. Follow the directions in each lab, save your answers, data, and pictures as the instructions indicate, and use those answers to complete the questions on the lab assignments. There are 10 Laboratory Assignments in the Tests & Quizzes area.

Exams:

There will be a *Midterm Exam* and a *Final Exam* for this course, both consisting of short-answer/essay questions. The *Midterm Exam* and the *Final Exam* are each worth 100 points. That means that collectively, they comprise 20% of your grade for this course, so please take the preparation for the exams in the forms of the previous assignments (and practice homework) very seriously. They are meant to help prepare you for these exams. The format of both of these exams is short answer/essay, so they will naturally be longer than your quizzes, and they are open book/notes. However, they are timed. You **MUST** show your work in order to receive any partial credit. You will have **2 hours** to complete each exam. After 2 hours, the exam will be submitted automatically and you will only be able to receive credit for what you have completed at that time. There are NO EXCEPTIONS to this policy.

Midterm Exam: This exam is cumulative/comprehensive and will cover Lessons 1-3, including labs.

Final Exam: This exam is cumulative/comprehensive but will only cover Lessons 4-6, including labs—everything since the Midterm. However, as you will learn, chemistry is a very cumulative/comprehensive subject whereby the material in subsequent chapters builds off material in previous chapters. So, there will certainly be information from the Midterm material found on the Final Exam that is inherent to the content. It's just that you will not be directly tested on the Lessons 1-3 material.

Please see the [student handbook](#) to reference the University's [grading scale](#).

Grading:

Name	Grade %
Discussion Forums	20.00 %
Week 1 Forum	1.25 %
Week 2 Forum	1.25 %
Week 3 Forum	1.25 %
Week 4 Forum	1.25 %
Week 5 Forum	1.25 %
Week 6 Forum	1.25 %
Week 7 Forum	1.25 %
Week 8 Forum	1.25 %
Week 9 Forum	1.25 %
Week 10 Forum	1.25 %
Week 11 Forum	1.25 %
Week 12 Forum	1.25 %
Week 13 Forum	1.25 %
Week 14 Forum	1.25 %
Week 15 Forum	1.25 %
Week 16 Forum	1.25 %
Lab Assignments	30.00 %
Lab 1 Assignment	3.00 %
Lab 2 Assignment	3.00 %
Lab 3 Assignment	3.00 %

Lab 4 Assignment	3.00 %
Lab 5 Assignment	3.00 %
Lab 6 Assignment	3.00 %
Lab 7 Assignment	3.00 %
Lab 8 Assignment	3.00 %
Lab 9 Assignment	3.00 %
Lab 10 Assignment	3.00 %
Lesson Quizzes	25.00 %
Lesson 1 Quiz	3.57 %
Lesson 2 Quiz	3.57 %
Lesson 3 Quiz	3.57 %
Lesson 4 Quiz	3.57 %
Lesson 5 Quiz	3.57 %
Lesson 6 Quiz	3.57 %
Lesson 7 Quiz	3.57 %
Exams	25.00 %
CHEM 133 Midterm Exam	12.50 %
CHEM 133 Final Exam	12.50 %

Materials

Book Title: CHEM133 E-Science Chemistry Kit

Author: eScience

Publication Info: eScience

ISBN: 4446

Book Title: Chemistry - e-book available online; links provided in the classroom Lessons section

Author: OpenStax

Publication Info:

ISBN: 9781938168390

Book Title: Until further notice, eScience kits will ship without any action needed from students. Your shipping address on file must be current - <https://apus.libanswers.com/coursematerials/faq/238652>

Author:

Publication Info:

ISBN: eScience Note

***NOTE*: This book will be used for both CHEM133 General Chemistry I and CHEM134 General Chemistry II, and it is available as an electronic book (e-book) that is free of charge to AMU/APU students. Please see Lesson 1 in the course for directions regarding how to access the text within the classroom.**

Required Technology

- See the Technology Requirements section of the undergraduate catalog for the minimum hardware and

software requirements.

- You will also need a scientific calculator with scientific notation and logarithmic functions. If you do not already own one, Microsoft® Calculator comes with windows PP or you may access an online calculator.
- Microsoft Office 365 is available to APUS students for free. To sign up, visit <http://products.office.com/en-us/student>. If you have questions about accessing the software, please contact Classroom support at classroomsupport@apus.edu.

Required Lab Materials:

The laboratory activities in this course will consist of a hybridized experience involving both virtual and hands-on components. Students will receive a laboratory kit from the university that they will use for the hands-on portion of the laboratory procedures, and will receive specific directions within each lesson regarding how to access any virtual components. Students will perform laboratory exercises that will teach laboratory techniques, as well as cultivate problem solving strategies in a laboratory setting, including generating and analyzing their own data and testing their own hypotheses.

Course Guidelines

Citation and Reference Style

- Attention Please: Students will follow the APA Format as the sole citation and reference style used in written work submitted as part of coursework to the University. Assignments completed in a narrative essay or composition format must follow the citation style cited in the APA Format.

Tutoring

- [Tutor.com](https://www.tutor.com) offers online homework help and learning resources by connecting students to certified tutors for one-on-one help. AMU and APU students are eligible for 10 free hours* of tutoring provided by APUS. Tutors are available 24/7 unless otherwise noted. Tutor.com also has a SkillCenter Resource Library offering educational resources, worksheets, videos, websites and career help. Accessing these resources does not count against tutoring hours and is also available 24/7. Please visit the APUS Library and search for 'Tutor' to create an account.

Late Assignments

- Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. The due date for each assignment is listed under each Assignment.
- Generally speaking, late work may result in a deduction up to 15% of the grade for each day late, not to exceed 5 days.
- As a working adult I know your time is limited and often out of your control. Faculty may be more flexible if they know ahead of time of any potential late assignments.

Turn It In

- Faculty may require assignments be submitted to Turnitin.com. Turnitin.com will analyze a paper and report instances of potential plagiarism for the student to edit before submitting it for a grade. In some cases professors may require students to use Turnitin.com. This is automatically processed through the Assignments area of the course.

Academic Dishonesty

- Academic Dishonesty incorporates more than plagiarism, which is using the work of others without citation. Academic dishonesty includes any use of content purchased or retrieved from web services such as CourseHero.com. Additionally, allowing your work to be placed on such web services is academic dishonesty, as it is enabling the dishonesty of others. The copy and pasting of content from

any web page, without citation as a direct quote, is academic dishonesty. When in doubt, do not copy/paste, and always cite.

Submission Guidelines

- Some assignments may have very specific requirements for formatting (such as font, margins, etc) and submission file type (such as .docx, .pdf, etc) See the assignment instructions for details. In general, standard file types such as those associated with Microsoft Office are preferred, unless otherwise specified.

Disclaimer Statement

- Course content may vary from the outline to meet the needs of this particular group.

Communicating on the Forum

- Forums are the heart of the interaction in this course. The more engaged and lively the exchanges, the more interesting and fun the course will be. Only substantive comments will receive credit. Although there is a final posting time after which the instructor will grade comments, it is not sufficient to wait until the last day to contribute your comments/questions on the forum. The purpose of the forums is to actively participate in an on-going discussion about the assigned content.
- “Substantive” means comments that contribute something new and hopefully important to the discussion. Thus a message that simply says “I agree” is not substantive. A substantive comment contributes a new idea or perspective, a good follow-up question to a point made, offers a response to a question, provides an example or illustration of a key point, points out an inconsistency in an argument, etc.
- As a class, if we run into conflicting view points, we must respect each individual's own opinion. Hateful and hurtful comments towards other individuals, students, groups, peoples, and/or societies will not be tolerated.

Identity Verification & Live Proctoring

- Faculty may require students to provide proof of identity when submitting assignments or completing assessments in this course. Verification may be in the form of a photograph and/or video of the student's face together with a valid photo ID, depending on the assignment format.
- Faculty may require live proctoring when completing assessments in this course. Proctoring may include identity verification and continuous monitoring of the student by webcam and microphone during testing.

University Policies

[Student Handbook](#)

- [Drop/Withdrawal policy](#)
- [Extension Requests](#)
- [Academic Probation](#)
- [Appeals](#)
- [Disability Accommodations](#)

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