

Abilene Approval Chart for Curriculum Changes

A = Approve I = Information Item R = Respond in Writing

Course Number CHEM 133 or Degree Plan(s) _____

State the requested change and reason. A memo may be attached if more space is

necessary.

This request is to add CHEM 133, General Chemistry I, to the Life and Physical Sciences Menu

Indicate the requested change.

	Change to a Course	Dept./School ¹	College	Dean	TEC	UGEC	AUAC/Grad	Provost	President
1.	Title (description unchanged)	A	A	A	I	–	I	I	I
2.	Description (not affecting content)	A	A	A	I	–	I	I	I
3.	Course term(s)	A	I	A	I	–	I	I	I
4.	Content (change of course outcomes)	A	A	A	I	–	I	A	I
5.	Number of hours (lecture, lab, contact)	A	A	A	A	–	A	A	I
6.	Course number within the hundred	A	A	I	I	–	I	I	I
7.	Course number beyond the hundred	A	A	A	A	–	A	A	I
8.	Prerequisites	A	A	A	I	–	I	I	I
9.	Course fee(s)	A	–	A	–	–	–	A	I
10.	From U to G or G to U	A	A	A	A	–	A	A	I
11.	Cross-list course	A	A	A	A	–	A	A	I
12.	Department of record	A	A	A	A	–	A	A	I
13.	Close a course	A	A	A	A	–	A	A	I
14.	New course (includes combining or splitting courses)	A	A	A	A	–	A	A	I

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	Change to the University Requirements (All Campuses)	Dept./School¹	College	Dean	TEC	UGEC	AUAC/Grad	Provost	Faculty	President	Trustees
1.	University Requirements — Change course outcomes of an included course ²	A	A	A	–	A	–	A	–	A	–
2.	University Requirements — Add or drop a required course from the University Requirements ²	A	A	A	–	A	–	A	A	A	–
3.	University Requirements — Add or drop a course from a menu within the University Requirements ²	A	–	–	–	A	–	A	–	A	–
4.	University Requirements — Change hours within a menu in the University Requirements ²	A	A	A	–	A	–	A	A	A	–
	Change to Catalog Information (for Campus)										
1.	General Requirements for Bachelor's Degrees and Associate's Degrees	–	–	–	–	–	A	A	A	A	–
2.	Policies governing academic probation and suspension	–	–	–	–	–	A	A	A	A	–
3.	Requirements for graduating with honors	–	–	–	–	–	A	A	A	A	–
	Change to a Degree Plan Proposed by Faculty or College										
5.	Educational Program — Revise ³	A	A	A	A	–	A	A	–	A	–
6.	Educational Program — Adopt/change admission requirements	A	A	A	A	–	A	A	–	A	–
7.	Educational Program — Add ³	A	A	A	A	–	A	A	A	A	I
8.	Educational Program — Discontinue	A	A	A	A	–	A	A	A	A	I
9.	GPA — Revise program-required GPAs	A	A	A	A	–	A	A	–	A	–
10.	Minor — Revise	A	A	A	I	–	I	I	–	I	–
11.	Minor — Add	A	A	A	A	–	A	A	–	A	–
12.	Minor — Discontinue	A	A	A	A	–	A	A	–	A	–
13.	Degree — Add	A	A	A	A	–	A	A	A	A	I
14.	Degree — Discontinue	A	A	A	A	–	A	A	A	A	I
	Change to a Degree Plan Proposed By Provost										
15.	Educational Program — Discontinue	R	–	R	A	–	A	A	A	A	I
16.	Minor — Discontinue	R	–	R	A	–	A	A	–	A	–
17.	Degree — Discontinue	R	–	R	A	–	A	A	A	A	I

¹ When an academic unit does not have a council, the UGEC and/or UUAC will serve as its academic council, depending on the nature of the issue.

² Courses that satisfy ACU's University Requirements will normally have lower-level numbering, be free of prerequisites and co-requisites, appeal to more than one or two majors, and "not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession" (SACS 2.7.3). Departments may request exceptions to the first three criteria.

³ For undergraduate majors, a minimum of 30 hours is required. These programs must have a minimum of 6 elective hours, unless the requirements of external accrediting bodies make it impossible.

Department/School Chair(s)	
	9/6/2022
_____ <i>Signature</i>	_____ <i>Approval date</i>
_____ <i>Signature</i>	_____ <i>Approval date</i>

College Academic Council(s)	
_____ <i>Signature</i>	_____ <i>Approval date</i>
_____ <i>Signature</i>	_____ <i>Approval date</i>

Dean(s)	
_____ <i>Signature</i>	_____ <i>Approval date</i>
_____ <i>Signature</i>	_____ <i>Approval date</i>

Teacher Education Council	
_____ <i>Chair's signature</i>	_____ <i>Approval date</i>

University General Education Council	
_____ <i>Chair's signature</i>	_____ <i>Approval date</i>

Abilene Undergraduate Academic Council	
_____ <i>Chair's signature</i>	_____ <i>Approval date</i>

Graduate Council	
_____ <i>Chair's signature</i>	_____ <i>Approval date</i>

Provost	
_____ <i>Signature</i>	_____ <i>Approval date</i>

Faculty	
_____ <i>Chair of Faculty Senate</i>	_____ <i>Approval date</i>

President	
_____ <i>Signature</i>	_____ <i>Approval date</i>

Application for Life and Physical Sciences Menu

Guidelines For All General Education Courses

1. All general education courses must be 100-level or above.
2. General education courses should present a breadth of knowledge, not focusing on skills, techniques, and procedures specific to a particular occupation or profession.
3. Individual courses will fulfill only a single general education requirement.
4. Courses free of prerequisites are preferred. Applications to add courses with prerequisites must provide additional evidence that the course contributes to a student's breadth of knowledge and is not specific to a particular occupation or profession.
5. Each course may appear on a maximum of two menus that accept applications (arts and humanities, cultural literacy, life and physical sciences, and social and behavioral sciences).

Life and Physical Sciences Description

Courses within this domain use the methods and models of the natural sciences to describe, explain, and predict phenomena in the physical world; they employ empirical evidence, scientific principles, and interactions among natural phenomena to understand the world around us.

Instructions

Complete this form and submit it with a course syllabus and approval chart to the University General Education Council. Faculty submitting an application should be prepared to perform annual assessment for their course. The assessment will be conducted with the rubric included in this course application.

Subject code, course number, and title of course:	CHEM 133 - General Chemistry I
Terms offered:	Fall, Spring
Catalog description:	Fundamental principles of chemistry including the structure of matter, stoichiometry, periodicity, bonding, and reactivity.
Course prerequisites:	MATH 109 or MATW 109 with minimum grade of "C", or MATH 124, or MATH 185, or mathematics placement testing into MATH 124 or MATH 185. Corequisite: CHEM 131
Cross-listed courses: *Note: Many gen ed courses are cross-listed between the Abilene and Dallas campuses.	N/A

Other general education menus on which the course appears or you are applying for:

N/A

Prerequisites

The council understands that many of the courses on this menu will have corequisites and that the second course in a sequence may also have a prerequisite.

1. Is the course a lower-division (100- to 200-level) course in astronomy, biology, chemistry, physics, agricultural science, environmental science, or geology?

☒ Yes

☐ No

If yes, continue to 2. If no, please explain how this course meets the description of life or physical sciences above. Applications for courses originating in other disciplines will be considered.

2. Does the course have more than one prerequisite and/or more than one corequisite?

☒ Yes

☐ No

If no, continue to 3. If yes, please explain why an exception should be made to include this course in the Life and Physical Sciences menu.

This course has a mathematics prerequisite that is equivalent to competency in high school algebra II, which is a standard course requirement for high school graduation. Unfortunately some entering students do not demonstrate algebra competency as evidenced by their performance on the math placement test. Students who do not place into Math 124 or above on a math placement test or successfully complete the remedial ACU course Math 109, do not perform well in General Chemistry according to historical data. Math placement tests are common requirements for enrolling in General Chemistry courses at the university level. This course also has a lab co-requisite. The lab supports the learning that occurs in the lecture.

3. If the course has prerequisites, provide evidence that the course contributes to a student's breadth of knowledge. Also provide evidence that the course content is not specific to a particular occupation or profession (200 words or less).

This is the first of the two semesters of general chemistry. It is a foundational course that explores basic chemistry that underpins much of the technology that drives our economy and impacts our environment. The course contributes to a student's scientific literacy by introducing them to asking and exploring scientific questions using real world data.

Relevant Outcomes

- C2: Analyze quantitative data, published writing, or observable phenomena to draw informed conclusions.
- C3: Interpret mathematical and/or logical models such as formulas, graphs, tables and schematics, and draw inferences from them; and
- C4: Integrate new data into their existing knowledge.

Describe how the course meets the C2 outcome (100 words or less).

Students learn how physical measurements of chemical phenomena are collected. They also learn how to tabulate data related to physical phenomena, suggest hypotheses that describe expected relationships and test those hypotheses through experimentation. Using outcomes of experiments, they learn how to make claims and support those claims with evidence from the data.

Describe how the course meets the C3 outcome (100 words or less).

Measurements and data are analyzed using typical statistical methods, including determining the mean and standard deviation, median, and looking for linear and non-linear relationships. Formulas and graphs that describe known physical and chemical phenomena are used to evaluate measurements and predict outcomes.

Describe how the course meets the C4 outcome (100 words or less).

Throughout this course students are encouraged to compare and contrast their growing chemical understanding with personal experience in nature. For example, when discussing melting points, students are asked to compare melting points of common substances and contrast the obvious characteristics of those substances that are aligned with the value of the melting points. This leads to observable patterns in nature.

Outcomes assessment should occur within one or two exams/assignments. Please indicate which exams or assignments will be used for each outcome. Provide assignment prompts if available.

Area to Be Assessed	Assessment Artifact
Outcome C2	ACS standardized final exam
Outcome C3	ACS standardized final exam
Outcome C4	ACS standardized final exam

Please use the following rubric to perform assessment each year.

Student Learning Outcome C2

Students will be able to:	Shortcomings	Meets Expectations	Points of Excellence
Analyze data to draw conclusions	Lacks sufficient analysis of data or published writing.	Analyzes data and/or published writing in an effective manner.	Analyzes data and/or published writing in an exemplary manner.

Student Learning Outcome C3

Students will be able to:	Shortcomings	Meets Expectations	Points of Excellence
Interpret mathematical and/or logical models such as formulas.	Little to no demonstrated ability to interpret relationships and/or data in models.	Demonstrates ability to interpret relationships and/or data in models.	Exceptional ability to interpret relationships and/or data in models.

Student Learning Outcome C4

Students will be able to:	Shortcomings	Meets Expectations	Points of Excellence
Integrate new data into their existing knowledge	Shows little to no grasp of new information and/or does not demonstrate adequate connection to previous learning.	Grasps new information and makes connections to previous learning.	Exceptional grasp of new information and/or demonstrates outstanding ability to connect to previous learning.

General Chemistry I

Fall 2022 Syllabus



CHEM-133.03
3 credit hours

Days/Time: TR 9:30 – 10:50 AM
Class Location: Onstead Science B69

Professor: Dr. Cynthia Powell
Office: Halbert-Walling Rm 105/107
Office hours: **Mon. 2-5 pm**
Wed. 2-4:30 pm
Fri. 9-11 am

Office phone: (325) 674-2864 or (325) 674-2351
Cell phone: (325) 370-1353
Campus mail: ACU Box 28132
Email: powellc@acu.edu

Mission of Abilene Christian University

To educate students for Christian service and leadership throughout the world.

Mission of the Department of Chemistry and Biochemistry at ACU

To prepare students for careers in chemistry, biochemistry, chemical education, and health professions by displaying high professional standards and by modeling Christian values, leadership, and service.

Course Description

From the Course Catalog: "Fundamental principles of chemistry including the structure of matter, stoichiometry, periodicity, bonding, and reactivity. Prerequisite: CHEM 131 or concurrent enrollment; and MATH 109 with minimum grade of "C", or MATH 124, or MATH 185, or placement into MATH 124 or 185."

Course Format

Class time will be divided among lecture, discussion, and occasional demonstrations/videos. Class discussion and questions are always welcomed, but no class participation grade or group grades will be given. Students are expected to take accurate notes, to fully participate in class activities, and to read the assigned materials. Students are encouraged to ask for clarification on any material covered in class and are encouraged and welcomed to visit the instructor during office hours.

Resources

Required:

- Required: (a) *Chemistry*, 2nd edition, Atoms First available for FREE DOWNLOAD at <https://openstax.org/details/books/chemistry-atoms-first-2e> or print copy purchasable at the bookstore or through independent suppliers
- (b) Aktiv Chemistry homework system can be purchased through the bookstore or on the site: <https://support.101edu.co/hc/en-us/articles/360034901254-How-do-I-pay-for-my-course-access->
You will need access for each semester you enroll in a General Chemistry course
- (c) A non-graphing scientific calculator (preferably a Texas Instruments TI-30XIIS)

Students will use the Canvas LMS system to examine or download the syllabus and other course documents (including problem sets and class notes in PDF format).

Academic Integrity

The full policy, ACU's Academic Integrity Policy, is available for review at the Provost's office web site: <https://cdn01.acu.edu/community/offices/administrative/office-of-the-provost/academic-integrity-policy/overview.html>.

Attendance Policy

Students are strongly encouraged not to miss class. The instructor may drop any student with **more than 6 absences** from the course, regardless of the reasons for the absences. You should inform the instructor at least *one week in advance* concerning university-approved events that will cause you to be absent and provide the university form completed by the event sponsor and signed by the dean and provost. For absences due to illness or emergency, inform the instructor *no later than 48 hours* after the class period you missed. You are responsible for the material covered in class when you are absent and all assignments are due on the assigned date regardless of class attendance. The student is responsible to contacting the professor to get any materials missed due to absence.

Electronic devices

Please bring your iPhone, iPad or iPod to class, but make sure they are in silent mode (OFF during testing). Students are not allowed to wear headphones during class. No electronic devices, phones or smart watches will be allowed on student desks during quizzes or exams.

Dress Code and COVID safety requirements

Students should conform to the dress code as outlined in the Student Handbook. To keep all members of our community safe, we ask that you follow any university guidelines for health and safety, regardless of COVID vaccination status. Students wearing inappropriate attire or not abiding by any health or safety protocols will be asked to leave class.

Course Competencies

In General Chemistry I, competence is expected with regard to:

1. Understanding and describing matter's structure and behavior
2. Developing analytical and critical thinking skills using quantitative data
3. Solving both numerical and conceptual problems using formulas, graphical analysis and tables
4. Understanding the impact of chemistry on daily life and the impact of research globally
5. Appreciating how our understanding of chemistry has changed over time

Grade

The following is the *strict* grading scale by which all grades will be determined:

A = 90-100, B = 80-89, C = 70-79, D = 60-69, F = below 60

Your grade in this course will be determined from homework assignments, in-class quizzes, exams, class participation and a final exam as detailed on the next page of this syllabus.

No make-up exams will be given without a physician's note or dean's notice for a university-related trip or ACU notification of required self-isolation due to COVID exposure. Exams, assignments, and quizzes missed because of university-approved trips should be completed and turned in prior to the trip (make arrangements with the instructor). If you are ill, you must notify the instructor within 24 hours of any missed exam or quiz. No late homework will be accepted as assignments can be completed online, but the lowest four homework/quiz scores will be dropped.

Agree Not to Share

ALL course materials posted in Canvas or handed out in class are copyrighted and are not to be shared in any format. This includes pictures, problems, or documents, provided by instructor or teaching assistants. No materials used in this class, including, but not limited to, online pages, images/pictures, documents, videos, problems, examples, assessment items (questions on quizzes or exams), in class materials, review sheets, or additional problem sets, may be shared online (or in any other way) or with anyone outside of the class unless you have the author's/creator's explicit, written permission. Such unauthorized sharing of materials is considered an act of academic dishonesty. Any suspected unauthorized sharing of materials will be investigated and if warranted, will be reported. These reports can result in sanctions, including but not limited to, failure in the assignment and/or course.

NOTE: Students must make a "C" or better in CHEM 133 before enrolling in CHEM 134 (General Chemistry II)

Quiz, Homework, and Exam Schedule

Assignment	Details	Date	Percentage Points
Online Homework/ In-class quizzes	Daily Aktiv Chemistry homework Announced short quizzes. An absence on the day a quiz is announced does not excuse you from being prepared for and taking an in-class quiz the next class period.	Homework due at times and dates posted in Canvas Quizzes will be given as announced	15% (lowest 4 scores dropped)
Exam 1*	Ch 1 – Essential Ideas Ch 2 – Atoms, Molecules, and Ions Ch 3.1-3.3, 3.6 Electronic Structure and Periodic Properties	September 13	65% (14% each for four high scores, 9% for lowest score)
Exam 2*	Ch 3.4,3.5, 3.7 – Electronic Structure and Periodic Properties Ch 4.1-4.3 – Chemical Bonding and Molecular Geometry	October 4	
Exam 3*	Ch 4.4-4.6 – Chemical Bonding and Molecular Geometry Ch 5 – Advanced Theories of Bonding Ch 6 – Composition of Substances and Solutions	October 25	
Exam 4*	Ch 7 – Stoichiometry of Chemical Reactions	November 15	
Exam 5*	Ch 8 – Gases Ch 9 – Thermochemistry	December 8	
Final Exam	“ ACS standardized exam”	Block Exam Check Final Exam Schedule	20%

Total Percentage Points: 100%

* Combination of multiple choice, true/false, matching, fill in the blank, and/or short answer questions

The instructors reserve the right to adjust the schedule as needed.

Reading Schedule

The following table lists the chapter sections that are tentatively scheduled to be the topics of discussion during the corresponding class periods.

Class Period Date	Chapter	Sections
Aug. 30	1	All (lab "review")
Sept 1	2	2.1 -2.4 (lab: history of QM)
Sept 6	2	3.1-3.2 (lab: worksheet)
Sept 8	3	3.3, 3.6
Sept 13		Exam 1
Sept 15		3.4-3.5
Sept. 20	3	3.7-4.1
Sept. 22	4	4.2 -4.3
		(lab: nomenclature practice)
Sept. 27	4	4.4
Sept. 29	4	4.4 -4.5
Oct 4		Exam 2
Oct 6	4	4.6
Oct. 11	5	4.6
Oct. 13	5	5.1-5.3
Oct. 18	6	6.1-6.2
Oct. 20	6	6.3-6.4
Oct 25		Exam 3
Oct 27	7	7.1-7.2
Nov 1	7	7.2
Nov 3	7	7.3
Nov. 8	7	7.4
Nov. 10	7	7.5
Nov 15		Exam 4
Nov. 17	8	8.1-8.2
Nov. 22	8	8.3-8.6
Nov. 29	9	9.1, 9.3
Dec 1	9	9.3
Dec 6	9	9.4
Dec 8		Exam 5

The study of science is the study of God's creation. Every calculation and observation is a glimpse into the creative mind of the Master of the universe. It is with awe that we approach any study of the Almighty and His works, and our response should be worship.