CORE CURRICULUM COMPONENT APPLICATION
Sam Houston State University

Revised October, 2012

PART I – Course Information

Course Type
☒ Existing/Restructured
☐ New Course Proposed Fall 2013
If new, have you submitted a Form B to the SHSU Curriculum Committee? ☐ Yes ☐ No

Course Prefix & Number: CHEM 1411

Texas Common Course Number (TCCN Matrix): CHEM 1411

Course Title: General Chemistry I

Course Catalog Description (Copy and paste from online catalog for existing courses):
The following topics are studied: chemical changes and laws governing them; nomenclature; introduction to thermodynamics; reactions involving oxygen, hydrogen, acids, bases, and salts; ionization; metathesis; the periodic table, and atomic and molecular structure. This course is for chemistry and other science majors. Prerequisite: Minimum grade of C in MTH 163 <MATH 1316>, MTH 170 <MATH 1314>, MTH 199 <MATH 1324> or MTH 284 <MATH 2384> or equivalent, or a minimum Math score of 270 on the THEA (or equivalent). Fall, Spring, Summer I. Credit 3.

Course Prerequisites: Minimum grade of C in MTH 163 <MATH 1316>, MTH 170 <MATH 1314>, MTH 199 <MATH 1324> or MTH 284 <MATH 2384> or equivalent, or a minimum Math score of 270 on the THEA (or equivalent).

The above is pasted from the current catalog. I would like to offer a clarification. The prerequisite is either not needing developmental math or, for those students who are required to take developmental math, the prerequisite is a C or better in the developmental math course and a C or better in an appropriate college-level math course.

Also, we have requested (in the current curriculum cycle) to combine CHEM 1311 & 1111 into CHEM 1411.

Available Online?
☐ Yes, currently developed in online delivery mode
☐ Anticipated development in online delivery mode (Semester, Year:)
☒ No

Number of Sections to be Offered per Academic Year: 10 lecture sections and 21 laboratory sections

Estimated Enrollment per Section: The lecture sections may range up to 80 students per section while the maximum for a laboratory section is 32.

Course Level (freshman, sophomore): freshman

Designated Contact Person (for follow-up communication purposes): Richard E. Norman

E-Mail Address: norman@shsu.edu

Phone: 4-1527

Approvals

Department Chair:	Signature	10/19/12 Date
Academic Dean:	Signature	10/19/12 Date

Submit completed, signed form to Core Curriculum Committee - Box 2478 or Fax 4-1271

PART II – THECB Foundational Component Areas

See Appendix for full description of each component area.

Select Component Area: III. Life and Physical Sciences

In one paragraph, describe how the proposed course will fulfill the core and skill objectives of the component area: According to the Appendix, courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences. A significant portion of this course focuses on conservation of mass principles and atomic structure. These principles are the basis of natural phenomena! Consequently, through our atomic and molecular perspective we describe, explain and predict the natural world and how the physical world impacts human experience. We describe and explain atomic and molecular structure and demonstrate and explain how these structures produce observable phenomena. The required skill objectives are critical thinking, communication, empirical & quantitative and team work. Chemistry is an empiricial and quantitative science, so these skills are emphasized in virtually every aspect of the course. In solving chemical problems, data is provided, and the students must determine from the data where to begin the problem, devise a possible route to the solution to the problem, execute their solution and ascertain whether their solution indeed solves the problem and makes sense--all aspects of critical thinking. Further, the student must be able to communicate their answer, their approach to their answer, and the validity of their answer. In the laboratory portion of the course, students work in teams on the various laboratory experiments.

PART III – Course Objectives & Student Learning Outcomes (SLO)

Insert the applicable course objectives stated as student learning outcomes (e.g., Students completing the course will be able to...) that support the core component area objectives. Please reference the component rubric for additional information on core component area objectives.

Objective/SLO 1: Students completing the course will be able to convert units of measure and demonstrate dimensional analysis skills (this is the 13th of 13 learning outcomes for General Chemistry I from the Lower-Division Academic Course Guide Manual published by THECB).

How will the objective be addressed (including strategies and techniques)?
Dimensional analysis is a fundamental approach to problem solving in chemistry. As such, it is covered extensively in lecture with many example problems worked (in a wide variety of contexts) throughout the semester. This approach to problem solving is further reinforced through work on recommended homework exercises as well as in several laboratory experiments. This approach is ubiquitous in chemistry.

Describe how the objective will be assessed: Student knowledge of the method and their ability to use it will be assessed through embedded questions on exams and in both prelab exercises and in the laboratory reports.

Objective/SLO 2: Students completing the course will be able to use the rules of nomenclature to name chemical compounds (this is the 9th of 13 learning outcomes for General Chemistry I from the Lower-Division Academic Course Guide Manual published by THECB).

How will the objective be addressed (including strategies and techniques)?
The rules of nomenclature are explained in lecture early in the course material, and are subsequently reexamined as clarifiying concepts (like electronegativity) are covered. Initially the rules of nomenclature are prescriptive--they simply must be memorized--but later we explain, because we finally have the basis to do so, why elements are named in particular order in simple inorganic molecules.

Describe how the objective will be assessed: Student knowledge and ability will be assessed through embedded questions on exams.

Objective/SLO 3: Students completing the course will be able to solve stoichiometric problems (this is the 6th of 13 learning outcomes for General Chemistry I from the Lower-Division Academic Course Guide Manual published by THECB).

How will the objective be addressed (including strategies and techniques)?
Stoichiometry is covered in the third, fourth and fifth chapters of the textbook, and is consequently covered extensively in lecture. Stoichiometry is an application of dimensional analysis utilizing balanced chemical equations and molecular weights to provide additional conversion factors. The solution of stoichiometry problems is further reinforced through work on recommended homework exercises as well as in several laboratory experiments.

Describe how the objective will be assessed: Student knowledge and ability will be assessed through embedded questions on exams.

Objective/SLO 4: Students completing the course will be able to describe the bonding in and the shape of simple molecules and ions (this is the 5th of 13 learning outcomes for General Chemistry I from the Lower-Division Academic Course Guide Manual published by THECB).

How will the objective be addressed (including strategies and techniques)?
Quantum numbers (and their subsequent relationship to orbitals), mixing of orbitals, the construction of Lewis dot structures, and the use of Valence Shell Electron Pair Repulsion theory to predict the shapes of molecules and polyatomic ions are discussed extensively in lecture, laboratory and reinforced through work on recommmended homework exercises.

Describe how the objective will be assessed: Student knowledge and ability will be assessed through embedded questions on exams and in the laboratory reports.

Objective/SLO 5: Students completing the course will be able to make careful and accurate experimental observations (this is the 4th of 9 learning outcomes for General Chemistry I lab from the Lower-Division Academic Course Guide Manual published by THECB).

How will the objective be addressed (including strategies and techniques)?
During the pre-laboratory exercises (lecture and write-up), students are instructed as to what kinds of observations they should be making and how to make these observations. During the course of the laboratory exercise, the students actively make observations--they learn by doing. In the post-laboratory exercises (lab reports), the students describe and discuss their observations.

Describe how the objective will be assessed: Student knowledge and ability will be assessed through embedded questions on laboratory exams and through the laboratory reports.

PART IV – THECB Skill Objectives

Address each of the THECB skill objectives required within the component area. Explain how the skill is addressed, including specific strategies to address the skill(s). *Address ALL skill objectives associated with the selected Component Area. (See Appendix)*

1. Critical Thinking Skills: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

How will the skill be addressed (including specific strategies, activities, and techniques)?
In our lectures we directly address problem solving skills in nearly every section of the course material. Data is presented, followed by preliminary analysis of the data to decide which problem-solving approach is needed, followed by the necessary steps to solve the problem and once a solution has been reached, we instruct students how to make sure that the answer is correct and appropriate. These skills are reinforced through practice as the students engage the recommended homework assignments. They are further reinforced on the hour exams, and again on the comprehensive final exam. In the laboratory exercises, the approach includes hands-on activities during which the students determine the necessary data, followed by the calculations.

2. Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication

How will the skill be addressed (including specific strategies, activities, and techniques)?
Communication is two-way--both interpretation and expression. In the lecture portion of the course, material is presented to the students in written, oral and visual modes, through writing on the white boards (or in power point presentations), through oral lecturing, and through graphical representation of ideas including drawings and graphs. Students answer exam questions and complete laboratory exercises primarily by written response. However certain questions require either a drawing or a graph. Virtually all of the oral communication by the student is done in the laboratory context of speaking with their lab partner to work on joint tasks. Students can also be given the opportunity to explain their reasoning on pre-laboratory exercises during their labs. This approach is used less frequently than it used to be in order to not embarrass the unprepared student. Another possible way to encourage oral communication would be to have the students participate in delivering the prelab lecture (typically a series of power point slides

that can be orally presented to the class--this task can rotate through all of the laboratory groups throughout the semester).

3. Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

How will the skill be addressed (including specific strategies, activities, and techniques)?
In our lectures we directly address problem solving skills in nearly every section of the course material. As discussed above under the critical thinking section, we teach approaches to problem solving from given data, which is reinforced through practice on recommended homework exercises, hour-long examinations and again on the final examination. In the laboratory exercises students themselves will generate numerical data which they then analyze. They also make observations during the course of several experiments which leads them to informed conclusions.

4. Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

How will the skill be addressed (including specific strategies, activities, and techniques)?
In the laboratory portion of the course, students work in teams on the various experiments. In some experiments, students must work jointly to accomplish the necessary task. In other experiments, the tasks can be subdivided, and each team member can work on their own portion of the exercise, but the results are combined into the final reported product.

5. Personal Responsibility: to include the ability to connect choices, actions and consequences to ethical decision-making

How will the skill be addressed (including specific strategies, activities, and techniques)?
Not required for Life and Physical Sciences

6. Social Responsibility: to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities

How will the skill be addressed (including specific strategies, activities, and techniques)?
Not required for Life and Physical Sciences

PART V – SHSU Core Curriculum Committee Requirements

1. Using a 15-week class schedule, identify the topics to be covered during each week of the semester. Provide sufficient detail to allow readers to understand the scope and sequence of topics covered.

Week 1	Matter (description), measurement (units and estimation of uncertainty), uncertainty in calculations (definition and use of significant figures), dimensional analysis and conversion factors (and their use as a fundamental approach to solving problems)
Week 2	Atomic theory of matter, atomic structure, atomic masses, introduction to periodic table, molecules and ions
Week 3	Inorganic nomenclature--ionic compounds, acids and molecules, simple organic molecules
Week 4	Begin stoichiometry (balancing chemical equations, mole concept, formula masses, empirical formulas, quantitative information from balanced chemical equations, limiting reactants & theoretical yield).
Week 5	Continue stoichiometry
Week 6	Continue stoichiometry, begin solution stoichiometry (aqueous solutions, reactions, concentrations, titrations)
Week 7	Continue solution stoichiometry
Week 8	Continue solution stoichiometry
Week 9	Thermochemistry (energy, temperature, first law of thermodynamics, enthalpy, calorimetry, Hess's law, enthalpies of formation)
Week 10	Electronic structure of atoms (light, quantization of light (photons), quantization of electronic energy levels, wave behavior of matter, quantum mechanics, quantum numbers, orbitals, atomic orbital energy diagrams, electron configurations, inherent structure of the periodic table)
Week 11	Continue electronic structure of atoms, Begin periodic properties of elements (sizes of atoms and ions, ionization energies, electron affinities, group trends)
Week 12	Continue periodic properties, begin concepts of chemical bonding (atomic Lewis symbols, ionic bonding, covalent bonding, Lewis dot structures--octets, minimizing formal charges, resonance, exceptions to the octet rule, bond strengths)
Week 13	Continue chemical bonding
Week 14	Continue chemical bonding, begin molecular geometry and bonding theory (valence shell electon pair repulsion theory, orbital overlap, valence bond theory, molecular orbital theory)

Week 15	Continue molecular geometry and bonding theory

2. Attachments (Syllabus Required)

Syllabus Attached? ☒ Yes ☐ No

Other Attached? ☒ Yes ☐ No If yes, specify: Excerpts from the Lower-Division Academic Course Guide Manual published by the Texas Higher Education Coordinating Board

Appendix: THECB Component Area Descriptions and Skill Requirements

I. Communication (Courses in this category focus on developing ideas and expressing them clearly, considering the effect of the message, fostering understanding, and building the skills needed to communicate persuasively. Courses involve the command of oral, aural, written, and visual literacy skills that enable people to exchange messages appropriate to the subject, occasion, and audience.)

II. Mathematics (Courses in this category focus on quantitative literacy in logic, patterns, and relationships. Courses involve the understanding of key mathematical concepts and the application of appropriate quantitative tools to everyday experience.)

III. Life and Physical Sciences (Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.)

IV. Language, Philosophy, and Culture (Courses in this category focus on how ideas, values, beliefs, and other aspects of culture express and affect human experience. Courses involve the exploration of ideas that foster aesthetic and intellectual creation in order to understand the human condition across cultures.)

V. Creative Arts (Courses in this category focus on the appreciation and analysis of creative artifacts and works of the human imagination. Courses involve the synthesis and interpretation of artistic expression and enable critical, creative, and innovative communication about works of art.)

VI. American History (Courses in this category focus on the consideration of past events and ideas relative to the United States, with the option of including Texas History for a portion of this component area. Courses involve the interaction among individuals, communities, states, the nation, and the world, considering how these interactions have contributed to the development of the United States and its global role.)

VII. Government/ Political Science (Courses in this category focus on consideration of the Constitution of the United States and the constitutions of the states, with special emphasis on that of Texas. Courses involve the analysis of governmental institutions, political behavior, civic engagement, and their political and philosophical foundations.)

VIII. Social and Behavioral Sciences (Courses in this category focus on the application of empirical and scientific methods that contribute to the understanding of what makes us human.
Courses involve the exploration of behavior and interactions among individuals, groups, institutions, and events, examining their impact on the individual, society, and culture.)

Required Skill Objectives

Foundational Component Areas	Skill Objectives					
	Critical Thinking	Communication	Empirical & Quantitative	Team Work	Social Responsibility	Personal Responsibility
Communication	✓	✓		✓		✓
Mathematics	✓	✓	✓			
Life and Physical Sciences	✓	✓	✓	✓		
Language, Philosophy & Culture	✓	✓			✓	✓
Creative Arts	✓	✓		✓	✓	
American History	✓	✓			✓	✓
Government/Political Science	✓	✓			✓	✓
Social and Behavioral Sciences	✓	✓	✓		✓	

Submit completed, signed form to Core Curriculum Committee - Box 2478 or Fax 4-1271

Syllabus: Chemistry 1411—General Chemistry I (TENTATIVE) **Term: Fall 2014**

Section:	To be determined	**Time:**	To be determined	**Room:**	To be determined
Instructor:	To be determined	**email address**		**Office:**	To be determined
Office Hours:	To be determined			**Phone:**	To be determined

Lecture Text: Brown and others, *Chemistry The Central Science*, **12th** Edition (13th by then?)
Laboratory Text: SHSU Students and Staff, *General Chemistry I Laboratory Manual*

Prerequisites: No previous knowledge of chemistry is expected or assumed. However, proficiency in algebra IS expected and assumed. The math prerequisite is a minimum grade of C in MATH 1314, 1316, 1324, 1410 or 2384, or a minimum Math score of 270 on THEA (or 23 ACT or 560 SAT).

Course Structure: There is a lecture portion and a laboratory portion of this course. In order to make a grade of C or better in the overall course, one must make a C or better in the lecture portion **and** a C or better in the laboratory portion. A grade of C or better in CHEM 1411 is the prerequisite for CHEM 1412.

Attendance: Attendance is required. Lecture attendance will be taken by assigned seating. If you are absent, it is your responsibility to obtain the lecture material that you missed. Occasionally, changes in schedule may be announced in class. These changes apply to you even if you were absent. Students who miss few classes tend to do better than students who miss repeatedly. However, class attendance will not specifically be used to evaluate student performance.

Students will be allowed to miss one laboratory provided that appropriate documentation, such as a note from a physician or military commander, is provided. A zero will be entered for any laboratory missed. You may **not** attend any lab section other than the one in which you are registered.

Course Summary: This is the first semester of general chemistry. This course is designed for science majors and minors including the following areas: chemistry, biology, physics, environmental science, geology, nutrition, and several pre-professional programs (PDT, PEN, PMD, PMT, POD, PPH, PPT, PPA, PPD, PVT). CHEM 1411 may also be a prerequisite for another course in your major or minor field. Chemistry is the study of matter and its changes. The material is naturally cumulative. The course will cover Chapters 1-9 of the textbook, and will emphasize atomic and molecular structure.

Objectives: Learn and master: dimensional analysis, details of ionic structure and nomenclature, stoichiometry, solution calculations, electronic structure, and more!

Calculator: The **only** calculator that you will be allowed to use on exams is a TI-30X series calculator. TI-34 and TI-36 are **not** TI-30X series calculators.

Grading: There will be 4 tests and a **comprehensive** final. Each test will be worth 100 points, and the final will be worth 200 points (for a total of 600 points for the lecture portion of the class). The laboratory portion of the course counts 20% of the total grade in the course (150 points).

Anticipated date	Exam	Points	
September 15, Monday	1st Exam	100 pts	
October 13, Monday	2nd Exam	100 pts	
November 3, Monday	3rd Exam	100 pts	
November 24, Monday	4th Exam	100 pts	**Last Day** December 5
December 10, Wednesday	Final	200 pts	11:00-1:00
Entire term	Laboratory	150 pts	
Total		750 pts	

Make-up examinations for the lecture portion of the course will **not** be given. Only the instructor can excuse a student from an examination. If you are excused from an examination, a score for the exam

you missed will be calculated based on your average class ranking on all of the other examinations (including the final).

Remember that in order to make a grade of C or better in the courses overall, one must make a C or better in the lecture portion ***and*** *a C or better in the laboratory portion*. In each portion of the course, in order to make an A, one must make 90% or more, 80% for a B, 70% for a C, and 60% for a D.

For the laboratory portion of the course there will be a midterm examination (which covers the labs up to the midterm exam only) and a final examination (which covers the labs after the midterm exam only). Laboratory Midterm and Final exams require that you bring a Scantron form. Make-up exams for either a missed Midterm or Final exam will be a Midterm/Final Cumulative exam (over all labs) given on the last class day (December 5) at 12:00 noon in CFS 101. Those who fail to take the midterm or final **and** miss the make-up will **fail** the laboratory portion of the course. You must contact the CHEM 1411 laboratory coordinator by 5 pm December 4 to be allowed to take the make-up exam. If you miss the midterm exam, you still need to take your lab's scheduled final **and** also the make-up exam.

Your lab TA does not assign lab grades. And furthermore, any statement written or verbal from your TA to you about your probable final grade in the laboratory portion is not binding. That is, since they don't assign your final grade, their estimation of your grade is only that, an estimate and could be incorrect. Your lab points will be used as a raw score to calculate your grade. Do not call the Chemistry Office or your lecture instructor and ask for your lab score/grade/points. You are responsible for keeping track of quizzes (20%), lab reports (40%), midterm exam (20%) and final exam (20%) grades. The lowest quiz and lab score will be dropped.

Cheating: Cheating will not be tolerated. For a first offense, a zero will be given for the entire exam (even if it is the final). A second offense earns an F in the course. While we make no attempt to provide a complete list of the various ways or types of cheating, the use of notes, looking at another student's paper, the use of a cell phone, using the wrong calculator, all during an examination, are examples of cheating.

There are several issues that should be included in all syllabi. Beyond what is provide here, additional details may be found at http://www.shsu.edu/syllabus. **Academic Dishonesty:** Students are expected to maintain honesty and integrity in the academic experiences both in and out of the classroom. **Classroom Rules of Conduct:** Students are expected to assist in maintaining a classroom environment that is conducive to learning. Students are expected to treat faculty and students with respect. Students are to turn off all cell phones while in the classroom. Under no circumstances are cell phones or any electronic devices (other than those explicitly allowed by the instructor) to be used or seen during exams. Students may tape record lectures provided they do not disturb other students in the process. **Student Absences on Religious Holy Days:** Students are allowed to miss class and other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. Students remain responsible for all work. **Students with Disabilities Policy:** It is the policy of Sam Houston State University that individuals otherwise qualified shall not be excluded, solely by reason of their disability, from participation in any academic program of the university. Further, they shall not be denied the benefits of these programs nor shall they be subjected to discrimination. Students with disabilities that might affect their academic performance should visit with the Office of Services for Students with Disabilities located in the Counseling Center. **Visitors in the Classroom:** Only registered students may attend class. Exceptions can be made on a case-by-case basis by the instructor. In all cases, visitors must not present a disruption to the class by their attendance. Students wishing to audit a class must apply to do so through the Registrar's Office.

Words of Wisdom: I encourage you to form small study groups to discuss the homework and material for this course. While homework will not be graded, it will have a dramatic effect on your learning. Whether you are giving or getting help in your group, you benefit from the interaction.

Chemistry is a subject that many people find difficult. Learning chemistry requires a considerable time commitment. This course may occupy as much of your time as possibly two other typical courses. Be prepared to spend time on studying chemistry **each day**. Don't plan on doing all of your studying on the night before, or even several nights before the exam! **Study regularly.** Chemistry is inherently comprehensive. All of the subjects build on what has gone before. If you fail to keep up, you will find yourself hopelessly buried and behind. Catch-up is a losing game.

The importance of doing problems cannot be overemphasized! This is the only way to learn the subject. The more problems you solve, the better prepared you will be for the exams. And while we are talking about working problems, be sure that you do not misuse the Solutions Manual. The proper way to tackle the problems is to work at them, struggle with them, and **ONLY** <u>after you have arrived at a solution</u> should you refer to the answers. It is too easy and sometimes too

tempting to look at the problem, immediately look at the answer, and then try to tell yourself that you understand how to do the problem. This is always a disaster!

Work as many problems as it takes to understand the material. If that is more than the suggested problems, there are certainly others in the textbook. If that is less than the suggested problems, that is fine. The goal is understanding.

Suggested Problems:

Chapter 1: 1,5,7,11-29(odd),33-41(odd),45-49(odd),59,62

Chapter 2: 1,4,6,17-31(odd),37-73(odd),90,104

Chapter 3: 1-13(odd),21,33-57(odd),61-69(odd),73-83(odd),105

Chapter 4: 1-11(odd),15,17,21,23,29,31,35-43(odd),47-53(odd),61-89(odd),99

Chapter 5: 1,5,15,19,27,39-47(odd),51-59(odd),63,65,69-79(odd)

Chapter 6: 2,15,17,23,25,51-65(odd),69-73(odd),78,90

Chapter 7: 7,19,23-31(odd),35-49(odd),61,63,67,73

Chapter 8: 1,7,13,17-23(odd),27,33-41(odd),51-57,61,63,69,90

Chapter 9: 1,3,9-31(odd),35-47(odd),51,55-67(odd),73,75,79-83(odd),89,92,94

Approximate Lecture Schedule

Day/Wk	Date	Section	Content
1-1	Aug 27		Introduction
2-1	Aug 29	Ch 1.1-1.4	Matter & Measurement
3-2	Sep 3	Ch 1.4-1.6	Units & Dimensional Analysis
4-2	Sep 5	Ch 2.1-2.4	Chemical Species: Atoms, Ions & Molecules
5-3	Sep 8	Ch 2.5	Periodic Table
6-3	Sep 10	Ch 2.6-2.7	Chemical Substances: Elements, Compounds & Solutions
7-3	Sep 12	Ch 2.8-2.9	Nomenclature
8-4	Sep 15 (M)		First Exam
9-4	Sep 17	Ch 3.1-3.2	Chemical Equations
10-4	Sep 19	Ch 3.1-3.2	Balancing & Simple Reactions
11-5	Sep 22	Ch 3.3-3.4	Formula Masses, Mole
12-5	Sep 24	Ch 3.3-3.4	Formula Stoichiometry
13-5	Sep 26	Ch 3.5-3.7	Equation Stoichiometry
14-6	Sep 29	Ch 3.5-3.7	Equation Stoichiometry
15-6	Oct 1	Ch 4.1-4.4	Solution Stoichiometry
16-6	Oct 3	Ch 4.1-4.4	Solution Stoichiometry
17-7	Oct 6	Ch 4.1-4.4	Solution Stoichiometry
18-7	Oct 8	Ch 4.5	Concentration
19-7	Oct 10	Ch 4.5	Concentration
20-8	Oct 13 (M)		Second Exam
21-8	Oct 15	Ch 4.6	Titrations
22-8	Oct 17	Ch 4.6	Titrations
23-9	Oct 20	Ch 5.1-5.2	Energy, Temperature, 1st Law of Thermodynamics
24-9	Oct 22	Ch 5.3-5.4	Enthalpy
25-9	Oct 24	Ch 5.5	Calorimetry
26-10	Oct 27	Ch 5.6-5.7	Hess's Law, Enthalpies of Formation
27-10	Oct 29	Ch 6.1-6.4	Wave behavior
28-10	Oct 31	Ch 6.5-6.6	Electronic Structure (Quantum Mechanics)
29-11	Nov 3 (M)		Third Exam
30-11	Nov 5	Ch 6.7-6.9	Electronic Structure
31-11	Nov 7	Ch 7	Periodic Properties
32-12	Nov 10	Ch 7	Periodic Properties
33-12	Nov 12	Ch 8	Concepts in Chemical Bonding
34-12	Nov 14	Ch 8	Concepts in Chemical Bonding
35-13	Nov 17	Ch 8	Concepts in Chemical Bonding
36-13	Nov 19	Ch 8	Concepts in Chemical Bonding
37-13	Nov 21	Ch 9	Molecular Structure
38-14	Nov 24 (M)		Fourth Exam
39-15	Dec 1	Ch 9	Molecular Structure
40-15	Dec 3	Ch 9	Molecular Structure
41-15	Dec 5	Ch 9	Molecular Structure

A more complete Laboratory Syllabus will be distributed in the Lab Sections

Approximate Laboratory Schedule

Week	Experiment
1 (9/8)	Check in, Safety, Basic Techniques (Experiment 1)
2 (9/15)	Physical Properties and Changes (Experiment 2)
3 (9/22)	Formula Stoichiometry (Experiment 7)
4 (9/29)	Reactions of Copper (Experiment 4)
5 (10/6)	% by Mass of an Unknown Mixture (Experiment 8)
6 (10/13)	Lab Midterm Exam (over 1st 5 labs)
7 (10/20)	Stoichiometric Calculations and Graphing (Experiment 5)
8 (10/27)	Acid-Base Titrations (Experiment 11)
9 (11/3)	Chemical Reactions: Stoichiometry (Experiment 9)
10 (11/10)	Specific Heat (Experiment 12)
11 (11/17)	Periodic Table and Lewis Dot Structures (Experiment 3)
12 (11/24)	Week of Thanksgiving
13 (12/1)	Lab Final Exam (over last 5 labs) & Check out
Friday 12/5	Cumulative Make-up Exam

Texas Higher Education
Coordinating Board

Lower-Division Academic Course Guide Manual

Revised Fall 2010

Texas Higher Education Coordinating Board

Academic Course Guide Manual (ACGM)
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2010-2011

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CHEM 1307 Introductory Chemistry II *(lecture)*
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CHEM 1406 Introductory Chemistry I (*lecture + lab, allied health emphasis*)
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CHEM 1408 Introductory Chemistry II (*lecture + lab, allied health emphasis*)

Survey course introducing chemistry. Topics may include inorganic, organic, biochemistry, food/physiological chemistry, and environmental/consumer chemistry. Designed for non-science and allied health students.

Approval Number 40.0501.51 03
CIP Area ..... Physical Sciences
maximum SCH per student 8
maximum SCH per course 4
maximum contact hours per course 112

CHEM 1311 General Chemistry I *(lecture)*

Fundamental principles of chemistry for majors in the sciences, health sciences, and engineering; topics include measurements, fundamental properties of matter, states of matter, chemical reactions, chemical stoichiometry, periodicity of elemental properties, atomic structure, chemical bonding, molecular structure, solutions, properties of gases, and an introduction to thermodynamics and descriptive chemistry.

Co-requisite: CHEM 1111—General Chemistry I Laboratory
Prerequisite: MATH 1314—College Algebra or equivalent academic preparation
High school chemistry is strongly recommended

Approval Number 40.0501.52 03
CIP Area ..... Physical Sciences
maximum SCH per student 3
maximum SCH per course 3
maximum contact hours per course 48

Learning Outcomes
Upon successful completion of this course, students will:

1. Define the fundamental properties of matter.
2. Classify matter, compounds, and chemical reactions.
3. Determine the basic nuclear and electronic structure of atoms.
4. Identify trends in chemical and physical properties of the elements using the Periodic Table.
5. Describe the bonding in and the shape of simple molecules and ions.
6. Solve stoichiometric problems.
7. Write chemical formulas.
8. Write and balance equations.

9. Use the rules of nomenclature to name chemical compounds.
10. Define the types and characteristics of chemical reactions.
11. Use the gas laws and basics of the Kinetic Molecular Theory to solve gas problems.
12. Determine the role of energy in physical changes and chemical reactions.
13. Convert units of measure and demonstrate dimensional analysis skills.

CHEM 1111 General Chemistry I *(lab)*

Basic laboratory experiments supporting theoretical principles presented in CHEM 1311; introduction of the scientific method, experimental design, data collection and analysis, and preparation of laboratory reports.

Co-requisite: CHEM 1311—General Chemistry I

Approval Number..... 40.0501.53 03
CIP Area ..... Physical Sciences
maximum SCH per student..... 1
maximum SCH per course 1
maximum contact hours per course..... 48

Learning Outcomes
Upon successful completion of this course, students will:

1. Use basic apparatus and apply experimental methodologies used in the chemistry laboratory.
2. Demonstrate safe and proper handling of laboratory equipment and chemicals.
3. Conduct basic laboratory experiments with proper laboratory techniques.
4. Make careful and accurate experimental observations.
5. Relate physical observations and measurements to theoretical principles.
6. Interpret laboratory results and experimental data, and reach logical conclusions.
7. Record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports.
8. Design fundamental experiments involving principles of chemistry.
9. Identify appropriate sources of information for conducting laboratory experiments involving principles of chemistry.

CHEM 1411 General Chemistry I *(lecture + lab)*

Note: This lecture and lab course should combine all of the elements of 1314 General Chemistry I Lecture and 1111 General Chemistry I Lab, including the learning outcomes listed for both courses.

Approval Number..... 40.0501.54 03
CIP Area ..... Physical Sciences
maximum SCH per student..... 4
maximum SCH per course 4
maximum contact hours per course..... 96

CHEM 1312 General Chemistry II *(lecture)*

Chemical equilibrium; phase diagrams and spectrometry; acid-base concepts; thermodynamics; kinetics; electrochemistry; nuclear chemistry; an introduction to organic chemistry and descriptive inorganic chemistry.

Co-requisite: CHEM 1112—General Chemistry II Laboratory
Prerequisite: CHEM 1311—General Chemistry I and CHEM 1111—General Chemistry I Laboratory, or CHEM 1411—General Chemistry I (Lecture and Laboratory)

Approval Number 40.0501.55 03
CIP Area ..... Physical Sciences
maximum SCH per student 3
maximum SCH per course 3
maximum contact hours per course 48

Learning Outcomes
Upon successful completion of this course, students will:

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

CHEM 1112 General Chemistry II *(lab)*

Basic laboratory experiments supporting theoretical principles presented in CHEM 1312; introduction of the scientific method, experimental design, chemical instrumentation, data collection and analysis, and preparation of laboratory reports.

Co-requisite: CHEM 1312—General Chemistry II

Approval Number 40.0501.56 03
CIP Area ..... Physical Sciences
maximum SCH per student 1
maximum SCH per course 1
maximum contact hours per course 48

Learning Outcomes
Upon successful completion of this course, students will:

1. Use basic apparatus and apply experimental methodologies used in the chemistry laboratory.
2. Demonstrate safe and proper handling of laboratory equipment and chemicals.
3. Conduct basic laboratory experiments with proper laboratory techniques.
4. Make careful and accurate experimental observations.
5. Relate physical observations and measurements to theoretical principles.
6. Interpret laboratory results and experimental data, and reach logical conclusions.
7. Record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports.
8. Design fundamental experiments involving principles of chemistry and chemical instrumentation.
9. Identify appropriate sources of information for conducting laboratory experiments involving principles of chemistry.

CHEM 1412 General Chemistry II *(lecture + lab)*

Note: This lecture and lab course should combine all of the elements of 1312 General Chemistry II Lecture and 1112 General Chemistry II Lab, including the learning outcomes listed for both courses.

Approval Number 40.0501.57 03
CIP Area ..... Physical Sciences
maximum SCH per student 4
maximum SCH per course 4
maximum contact hours per course 96

CHEM 1413 General Chemistry I (*lecture + lab, allied health emphasis*)
CHEM 1414 General Chemistry II (*lecture + lab, allied health emphasis*)

General principles, problems, fundamental laws, and theories. Course content provides a foundation for work in advanced chemistry and related sciences.

Approval Number 40.0501.58 03
CIP Area ..... Physical Sciences
maximum SCH per student 8
maximum SCH per course 4
maximum contact hours per course 112