Course Syllabus
Chemistry 133
General Chemistry I

Course Description: Atomic and molecular structures, stoichiometry, gas laws and thermodynamics.

Number of Credit Hours: 3 semester hours - 3 hours lecture per week

Course Prerequisites and Corequisites: Prerequisite: MTH 138 Corequisite: CHE 133L.

Program Learning Outcomes: There are no specific program learning outcomes for this major addressed in this course. This course is a general education core curriculum course and a service course.

Core Objectives (CO):

1. Critical Thinking: to include creative thinking, innovation, inquiry and analysis, evaluation and synthesis of information.
2. Communication Skills: to include effective development, interpretation and expression of ideas through written, oral, and visual communication.
3. Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in 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.

Student Learning Outcomes: Upon completion of this course, the students are expected to

- apply chemistry concepts using critical thinking skills and the scientific method to analyze and evaluate information to reach conclusions within problem sets and lab experiments. (COs 1 & 3)
- use communication skills to demonstrate their interpretation and analysis of scientific data. (CO 2)
- apply logic, quantitative reasoning, and pattern recognition to analyze and evaluate numerical data/observable facts to reach conclusions within problem sets and lab experiments. (COs 1 & 3)
- demonstrate the ability to cooperate within groups to gather results of an experiment, analyze data, and draw conclusions using communication skills. (COs 2 & 4)

Course Objective: To provide students with an explanation of the basic concepts of chemistry and to apply these concepts to problem solving involving critical thinking.

TEXTS AND MATERIALS:

Lecture:

Brown, Lemay, et al. Chemistry: The Central Science, 12th ed. Pearson, 2012 (ISBN: 978-0-321-69672-4)

Lab:

Frantzen, A. S. Chemistry 133 Laboratory Manual Fall 2013/Spring 2014/Summer 2014.

COURSE REQUIREMENTS:

Lecture: (VARIES BY SECTION)

3-hour exams (100 pts per test) cumulative with emphasis on the material covered since last. These exams will be given in class on or around September 24, October 29, and November 26. These exams will consist of problems that must be set up and solved, discussion questions, and/or multiple choice. Partial credit will be given for short answer problems worked partially correct; therefore, it is crucial to show your solutions to the problems, not just the answer. Credit will not be given for correct answers unless you show how you arrived at the answer. Multiple choice questions will have no partial credit.

Final Exam – comprehensive multiple choice exam worth 200 pts. Check Final Exam schedule for date.

Homework – Homework will total 50 points (#points correct*50 / total points available). The homework assignments will be completed via Internet with due dates assigned for the beginning of class. Any computer capable of connecting to the internet can assess the homework system at http://i-assign.com Enter teacher's 4-digit ID: 0002, course number: 4, your 4-digit student ID#: XXXX, your student password: XXXXXXXX (information handed out in class). First time you log in, please identify yourself on Main Menu screen and change password if you desire. **(COs: 1, 3)**

Lab:

Conduct 12 experiments – Lab Report is due at end of the lab period. Grade of "0" will be given for any experiment for which a lab report is not submitted. Note that the formal reports for experiments 1 and the titrations (5, 6, 7) must be uploaded to D2L for core objectives assessment **(COs: 1, 2, 3, 4)**.

Quizzes – There will be quizzes given over previous experiments and upcoming experiment for that day.

Nomenclature Quiz – There will be a quiz that will be given during class covering the nomenclature outside exercise.

Final Exam – There will be a comprehensive final given during the scheduled time.

Outline of Topics (approximate course time):
Chemistry and Measurement (5-15%)
Atoms, Elements, Molecules, Ions, and Compounds (5-15%)
Chemical Formulas and Equations (5-15%)
Chemical Reactions (5-15%)
Gases (5-15%)
Thermochemistry (5-15%)
Quantum Theory of the Atom (5-15%)
Periodic Properties of the Elements (5-15%)
Chemical Bonding – Lewis Structures (5-15%)
Molecular Geometry and Bonding Theory (5-15%)
Liquids, Solids, and Intermolecular Forces (5-15%)
Solutions (5-15%)

COURSE CALENDARS:
Lecture:

Month	Day	Activity	Core Objective
August	27	Chapter 1: Introduction, History, Units, Nomenclature	CO 1: *Instructors* will demonstrate the use of critical thinking throughout the semester. Starting with the concept of significant figures in calculations and how important they are in the field of chemistry, instructors will perform unit conversions and show students the logical progression through the problems to a final answer. *Students* will model this exercise in additional problem sets for the development of critical thinking skills.
	29	Units, Dimensional Analysis	CO1: *Instructors* will continue to demonstrate the use of critical thinking skills in solving more complex problems. Instructors will provide the students will a detailed progression through how to develop a logical solution to unit conversion using the method of dimensional analysis. This method will be used in many different applications and it is critical the students learn how to apply it in chemical problems. *Students* will model this exercise in additional problem sets for the development of critical thinking skills.
September	3	Dimensional Analysis	

	5	Chapter 2: Atoms, Molecules, Ions, History	
	10	Periodic Table, Nomenclature	
	12	Chapter 3: Stoichiometry, Balancing Equations	CO 3: *Instructors* will demonstrate the process of quantitative reasoning using the concept of stoichiometry. This allows for the logical prediction of amounts used in reaction. The process requires the combination of many skills; nomenclature, balancing equations, stoichiometry, and unit conversions. Instructors will demonstrate how to logical analyze information using the above mentioned skills. *Students* will model this in additional problems sets for the development of quantitative reasoning skills.
	17	Mole Concept, Empirical Formulas	
	19	Quantitative Descriptions of Equations	
	24	Chapter 4: Reactions in Aqueous Solutions Solubility Rules	
	26	Acid, Bases, Neutralization Reactions Redox Reactions	CO 3: *Instructors* will demonstrate the process of quantitative reasoning using the concept of stoichiometry and applying it to specific types of reactions. This allows for the logical prediction of amounts used in reaction. The process requires the combination of many skills; nomenclature, balancing equations, stoichiometry, and unit conversions. Instructors will demonstrate how to logical analyze information using the above mentioned skills. *Students* will model this in additional problems sets for the development of quantitative reasoning skills.
October	1	Concentrations, Stoichiometry	

	3	Chapter 10: Pressure, Empirical Gas Laws	
	8	Ideal Gas Equation, Stoichiometry	
	10	Kinetic-Molecular Theory Effusion and Diffusion Real Gases	
	15	Chapter 5: Energy, First Law of Thermodynamics	
	17	Enthalpy, Stoichiometry and Enthalpy	
	22	Calorimetry, Hess' Law, Formation	
	24	Chapter 6: Light, Energy, Photons, Bohr Model	
	29	Wave Behavior, Quantum Numbers, Atomic Orbitals, Electron Configuration	
	31	Chapter 7: Periodic Properties Trends in the Periodic Table	
November	5	Chapter 8: Chemical Bonding Ionic Bonding, Covalent Bonding Polarity and Electronegativity	
	7	Lewis Structures, Resonance Structures, Exceptions to Rules	
	12	Chapter 9: Molecular Shapes, VSEPR Model, Hybrid Orbitals, Multiple Bonds	
	14	Molecular Orbitals Chapter 11: Liquids, Intermolecular Forces, Properties	
	19	Phase Changes, Vapor Pressure, Phase Diagrams	

	21	Chapter 12: Classification of Solids, Types of Solids	
	26	Chapter 13: Solution Properties, Solubility, Concentration	
	28	THANKSGIVING	No Class
December	3	Colligative Properties	
	5	Review	
	10	Finals Week	

Lab:

Month	Date	Activity	Core Objective
August	27	Recitation, Orientation and Safety Science Building, room 234 Begin Nomenclature Practice.	CO 2 (written): *Instructors* will lecture over the skills involved in communicating through writing effectively. The instructor will review the required written report format for lab (attached) in great detail. CO 2 (oral): *Instructors* will lecture over the proper way to orally communicate with a lab partner, which involves answering, asking, and listening effectively to contribute to the group's purpose. The instructor will discuss how students should orally contribute thoughtful, concise, and insightful ideas to their group if they want to successfully complete the lab experiments safely, efficiently, and accurately. CO 4: *Instructors* will lecture over the skills involved in teamwork. The instructor will explain the importance of teamwork in the lab if the group wants to successfully complete the lab experiments safely, efficiently, and accurately. The instructor will lecture over the proper techniques for a team to gather the results, analyze the results, and draw conclusions based on the team's viewpoints.
	28-29	Significant Figures Laboratory Meet in Chemistry Building Room 106	
September	3	Recitation for The Factor Label Method	CO 1: *Instructors* will demonstrate the process of critical thinking within exercises used to analyze the acidity/basicity of salt solutions. During the exercise, the Instructors will apply the concepts of dimensional analysis and conversion factors in working factor label

			problems. Instructors will highlight their logic used to guide them to their conclusions. The *students* will model this exercise in additional problem sets for the development of critical thinking skills.
	4-5	Factor Label Method Dry Lab Meet in Chemistry Building room 106 Check-In, Chemistry Building room 101, 102, or 105	
	10	Recitation Experiment #1 Science Building room 234	CO 2 (visual): *Instructors* will lecture over the skills involved in visual communication. The instructor will review the proper techniques of representing data within graphs and tables with several examples. CO 2 (visual): The *students* will demonstrate visual communication skills in experiment 1. Students will apply the information on visual communication discussed prior to this experiment. Students must graph the mass of an unknown metal against its volume to determine the slope of the line, which represents the density of the metal. The student must graph this information in an organized, clear, and accurate manner. The students will upload the graph within the formal lab report to D2L and be assessed using a visual communication rubric for the graph in experiment 1.
	11-12	Experiment #1, Identification of an Unknown Solid	
	17	Recitation Experiment #2 Science Building room 234 Purpose statement for experiment 2 must be	

		written in Lab Notebook	
	18-19	Experiment #2, Chromatography of M&M Candies Turn in Written Report #1	
	24	Recitation Experiment #3 Purpose statement for experiment 3 must be in Lab Notebook	
	25-26	Experiment #3, Measuring Liquid Volumes	
October	1	Recitation Experiment #4 Purpose statement for experiment 4 must be written in Lab Notebook Procedure for experiment 4 must be written in Lab Notebook	
	2-3	Experiment #4, Formula of a Hydrate Turn in Written Report #2	
	8	Recitation for Experiment #8 Purpose statement for experiment 8 must be written in Lab Notebook Procedure for experiment 8 must be written in Lab Notebook	
	9-10	Experiment #8, Endothermic and Exothermic Reactions	
	15	Recitation Nomenclature	
	16-17	Nomenclature Dry Lab	
	22	Recitation Experiment #9 Purpose statement for experiment 9 must be written in Lab Notebook Procedure for experiment 9 must be written in Lab Notebook	
	23-24	Experiment #9, Gas Laws	
	29	Recitation for Experiment #5	

		Purpose statement for experiment 5 must be written in Lab Notebook Procedure for experiment 5 must be written in Lab Notebook Nomenclature Quiz	
	30-31	Experiment #5, Preparation and Standardization of NaOH Solution	
November	5	Recitation Experiments #6 & #7 Purpose statement for experiments #6 & #7 must be written in Lab Notebook Procedure for experiments #6 & #7 must be written in Lab Notebook Treat these as two separate experiments when writing in your Lab Notebook	CO 1: The *students* will model the process of critical thinking in experiment 7 using the scientific method. This experiment requires students to analyze a sample of commercial vinegar to ensure the manufacturers are adhering to the industry standard. Students will use the solution prepared in experiment 5 to accomplish this. They will predict how much of their solution is required to accomplish the task at hand. They will upload results to D2L and be assessed using a critical thinking rubric over this experiment. Conclusions will be based on the analysis of the theoretical information gathered and experimental data collected. This experiment is conducted with very little guidance from instructors.
	6-7	Experiment #6, Acid/Base Titration Experiment #7, Vinegar Analysis	CO 2 (oral): The *students* will demonstrate oral communication skills in experiments 6 & 7. Students will apply during the semester the information on oral communication discussed on day 1 of the semester and develop their oral skills between group members. Students must verbally communicate with their lab partner, which involves answering, asking, and listening effectively to contribute to the group's purpose. The students will contribute orally with thoughtful, concise, and insightful ideas to their group. Since

			this experiment has very little guidance from the instructor, this experiment depends heavily on good oral communication if the group is to be successful in accomplishing the experiment efficiently and accurately. The conclusions in this experiment are draw based on the team's oral discussion of the collected data. The students will answer a survey via D2L regarding their partner's oral communication skills during experiment 6 & 7. CO 2 (written): The *students* will demonstrate written communication skills in experiments 5, 6 & 7. Students will apply during the semester the information on written communication discussed on day 1 of the semester and develop their writing skills while obtaining feedback from the instructor. The students will upload a formal report to D2L and be assessed using a written communication rubric over experiments 5, 6 & 7 written lab report. CO 3: The *students* will model the process of quantitative reasoning in experiments 6 & 7 which involves the determination of concentration of an acid solution and commercial vinegar. This experiment requires students to use a solution they prepared and standardized to collect data on the two samples. The experiments are carried out in triplicate and students must first manipulate their data and then carry out statistical analysis. The students must compare their results to the predictions they made (CO 1) and the commercial values published. The students will upload the quantitative

			results within the formal lab report to D2L and be assessed using a quantitative reasoning rubric over the quantitative calculations, analysis, and interpretation of results in experiments 6 & 7. CO 4: The *students* will demonstrate teamwork skills in experiments 5, 6, & 7. Students will apply during the semester the information on teamwork discussed on day 1 of the semester and develop their teamwork skills. However, in this particular experiment, teamwork is extremely crucial because their results are dependent on the success of experiment 5. The students must work together to properly prepare and standardize a solution to be used in the analysis of an acid solution and a vinegar sample. A total group effort is required to complete the task at hand efficiently and accurately. The students will answer a survey via D2L regarding their partner's teamwork skills during experiments 5, 6, & 7.
	12	Recitation Experiments #10 & #11 Purpose statement for experiments #10 & #11 must be written in Lab Notebook Procedure for experiments #10 & #11 must be written in Lab Notebook Treat these as two separate experiments when writing in your Lab Notebook	
	13-14	Experiment #10, Heat of Fusion of Ice Experiment #11, The Enthalpy of Neutralization of Phosphoric Acid Turn in Written Report #3	

	19	Recitation Experiment #12 Purpose statement for experiment #12 must be written in Lab Notebook Procedure for experiment #12 must be written in Lab Notebook	
	20-21	Experiment #12 Check Out	
	26	Review for final exam	
	27-28	Thanksgiving Holiday	
December	3	Final Exam 5-7pm, Location to be announced	
	4-5	**NO LAB**	
	9-13	Final Exam Week	

GRADING POLICY:

Lecture: (VARIES BY SECTION)

The final grade will be based upon percentage of points obtained in the following:

exam 1	100 pts
exam 2	100 pts
exam 3	100 pts
final exam	200 pts
homework	50 pts
Total	650 pts

Grading scale - A= 90 - 100%; B= 80 - 89%; C= 70 - 79%; D= 60 - 69%; F= below 60%

Lab:

Grading is on a 260 point scale. Each experiment counts 10 points. The lowest two experiment grades will be dropped. Reports will count 60 points. No report grades will be dropped. Quizzes will be given during the recitation. Quizzes are worth 6 points each. The top five quizzes will be counted towards the final grade. The nomenclature quiz is worth 20 points. The final exam is worth 50 points. The final exam will be given December 3, 2013 from 5-7 pm, location will be announced. Failure to take the final will result in a failing grade for the course.

Grading scale - A $\geq$ 234; B $\geq$ 202; C $\geq$ 169; D $\geq$ 130; F = below 130

ATTENDANCE POLICY:

Lecture:

Attendance of class is mandatory. A total of four unexcused absences will result in the student being dropped from the class with a grade of "F". There will be **no make-up** exams.

Lab:

Attendance of class is mandatory. A total of two unexcused absences will result in the student being dropped from the class with a grade of "F". There will be **no make-up** exams, quizzes, or labs. Please make the instructor aware of any university related absences well in advance. Attendance is required at both recitation and laboratory.

ACADEMIC INTEGRITY (A-9.1):

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at
http://www.sfasu.edu/policies/academic_integrity.asp

Any student found cheating will be subject to the penalties as stated in the Student Code of Conduct handbook; including but not limited to a score of zero on exam, expulsion from the class or expulsion from the University.

WITHHELD GRADES SEMESTER GRADES POLICY (A-54):

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or

the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

STUDENTS WITH DISABILITIES:

To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

ACCEPTABLE STUDENT BEHAVIOR:

Classroom behavior should not interfere with the instructor's ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

CLASSROOM BEHAVIOR POLICY:

1) Come to lab and recitation prepared and on time
2) Come dressed as described in the safety rules that will be given
3) Follow all safety rules and good laboratory practices at all time
4) Do not begin an experiment without a teaching assistant present
5) Wear safety glasses/goggles when **anyone** in the lab is working on an experiment
6) Be courteous and respectful of other students, laboratory assistants, and stockroom personnel
7) Learn your section number and your laboratory assistant's name
8) Work with assigned lab partner unless otherwise instructed by the lab assistant

9) Stay in assigned sections
10) Students are responsible for any answer they report on a lab, assignment, or quiz. Laboratory teaching assistants are students and sometimes may make an error. You cannot claim the lab assistant told you the wrong answer and expect to get points back
11) Significant figures are required on all answers given in lab
12) No make up quizzes will be given if a student comes in late and misses the quiz.
13) Using material from previous semesters is considered cheating and will result in an assigned grade of zero (0) for the assignment in question
14) Questions concerning grades must be asked within **one week** of receiving the graded material.

RECITATION: During the recitation session the concepts and calculations for the laboratory experiment will be covered. To be prepared for recitation, the student should have an outline of the procedure for the experiment completed in the laboratory notebook. The format for outlining the experiment is given below. The outlines will be checked at recitation. Quizzes will also be given during the first 15 minutes of the recitation period. No make-up quizzes will be given.

LAB NOTEBOOK/REPORT:

The laboratory notebook must be a permanently bound book with alternating white and yellow quadrille ruled sheets. The yellow sheets will be used to make carbon copies of the original white sheets. The carbon copies are to be handed in as the lab report.

RULES FOR LAB NOTEBOOK

a.) **Must obtain TA's or instructor's initials in notebook before leaving lab each day. Lab reports that do not have initials will receive a grade of "0".**
b.) ALL DATA IS TO BE RECORDED IN BLACK INK DIRECTLY IN THE NOTEBOOK!!!!
c.) Label and date all entries.
d.) An error should be lined through with a single horizontal line, initialed and briefly explained.
e.) A single diagonal line should be drawn across any page that is to be ignored, initialed and briefly explained. This includes completely blank pages.
f.) The backs of the yellow pages may be used for scratch work BUT, measurements and readings are to be recorded as DATA.
g.) Number all the pages in the notebook in the upper right hand corner of the page. The yellow carbon copies must bear the same number as the white originals.
h.) Use page 1 for a TABLE OF CONTENTS. This should be maintained on a current basis at all times.
i.) Use page 2 for a PREFACE and a table of abbreviations. Include your name, classification, major, course title, number, section, semester, year, and instructor.

RULES FOR LAB NOTEBOOK REPORTS ***(except for experiments 17 and 26 which will be formal reports that must be uploaded to D2L)***

1.) **Title and Introduction (done before class and checked by TA)**
Give the title of the experiment and a 1 or 2 sentence description of the experiment. This should be done in your own words -- do not copy from the manuals. Important chemical reactions should also be included here.

2.) **Experimental Plan (done before class and checked by TA)**
Provide a summary of the experimental procedure. Read the lab and be familiar with what will be happening. Summarize the steps in your own words.

3.) **Procedure and Data**
This section is the laboratory "diary" in which you write a step-by-step description of what you do in the lab. Enter data as it is collected. Any observations are to be recorded here also (colors, odors, temp., apparatus used, amounts of reagents, etc.). Draw pictures if appropriate, use tables, graphs, equations, etc. Record details such as Instrument name and maker, model number and serial number, chemical manufacturer, grade, lot number and expiration date, etc.

4.) **Calculations**
Give one example of each type of calculation used in the experiment that has not been included in the previous section. In general, this section will deal with the calculation of the final results. Be sure to include a set-up with all appropriate units. Whenever multiple samples of the unknown are analyzed, the average and the standard deviation (s) should be calculated.

5.) **Discussion**
This section includes all relevant results and supporting chemical theories and concepts pertaining to the experiment. You must be able to convey your understanding of what went on in the experiment. Any deviation of results from the expected results must be addressed and explained. Objectively evaluate the results in terms of their precision/accuracy. Speculate as to any sources of error.

6.) **Conclusion**
Report unknown number and final results. Final results will be graded on quantitative/qualitative basis.